ADVERTISING PAGES REMOVED

No Boom Market

THE figures for business done in the country for the first quarter have been gathered and are becoming current just now. Are they enlightening? We'll say they are and also that they are highly gratifying.

For instance, 280 corporation reports made public by May 3 show a 41.8 per cent increased net earning for the first quarter of this year over the net for the same period a year ago. The aggregate net total was $418,313,000. That the second quarter totals will be still larger, was clearly indicated by the reports.

The volume of industrial production and the pace of commercial activity is continuing without let-up is the report of the American Bankers' Association of May 1.

Employment of labor on May 1 at 11,313,000 is higher than the peak employment in industry of 1929. And yet, an aggregate of four and one-half million people are drawing tax money from the relief agencies and W.P.A.

Business is forging ahead in spite of the muddling and meddling of the politician with business machinery. How good it might be or how much better it will be, can only be approximated.

The sour figures on exports and imports were another disappointment. The first quarter shows an excess of $113,000,000.00 more imports than exports —the first time in years that so heavy an export balance ran against the United States. And the pity of it is that the great volume of these excess imports come at the expense of our domestic producers. We have finally lived to see the day that the politician shows the American business man how much better it is to open the American markets to the foreign producers and put the American producers on the relief rolls or in the W.P.A. ranks to be paid for by American taxes. It is a great policy if enough taxes can be secured to keep five million idle producers satisfied.

Concurrent with the expansion of general business, the paper industry maintains its fine showing. The kraft paper division shows a production average of 99 per cent for the first four months as compared to 76.6 per cent a year ago. However, despite this highest continuous operating figure, a back log of unfilled tonnage keeps piling up and it is impossible for any commercial stocks to be acquired because all shipments are being absorbed as soon as they reach the markets.

The tight pulp situation is a marked factor. Practically all of the unbleached sulphate pulp that can be produced in 1938 is already sold and contracted for at prices ranging from $45.00 to $60.00 a ton c.i.f. seaboard ports. Seventy-five per cent of the sulphite pulp production is also sold for 1938 delivery. The remaining 25 per cent is being deliberately held by producers for higher prices—that is, prices from $75.00 to $90.00 a ton.

Sometime during this coming third and fourth quarters, there will be an acute famine in paper.

+ EDITORIAL +

Many of the paper mills are or will be totally without pulp, and their inability to deliver will throw an additional burden upon the self-contained producers. Already, one hears expressions like this—"Don't make any quotations if you don't want orders" and premiums are being offered for spot paper and pulp every day.

This is no boom market. It is simply a case of demand and supply. No one has ever developed a political formula to beat that old economic yard stick, "demand and supply."

That Question of Water

WHAT is your water cost per ton of product? Do you know how many gallons of water are being used in your mill for all of the various purposes to which it is put? Do you know how much it costs to deliver this water to its points of application?

The quantity of water used per ton of pulp and per ton of paper seems to vary over exceedingly wide limits; and, then too, there is the situation of the mill which does not know how much water it is using. In the former case, where data are available, it is easy enough to determine how large a factor in the total cost of production is the water used in the process. In the latter case, no definite calculation could be made; and the best figure that might be given would be no better than a guess.

It is conceded that two equally efficient mills producing a comparable line of products might vary somewhat in their water requirements. Individual practice would justify such a variation. If literature references and figures of individual mill practice, however, are to be taken with any degree of authenticity, it seems that the variation in mills of the same kind is too great.

One authoritative reference, for example, gives a figure of 115,000 gallons of water per ton of kraft pulp and a figure of 30,000 to 40,000 gallons per ton of paper. Contrast such figures with 34,000 gallons of fresh water per ton of pulp and 12,500 gallons per ton of paper, the quantities of water being used for pulping and for the making of paper by one of the country's best known kraft mills. Similar variations could be cited in literature references for certain other types of mills.

The mill with the lower water requirements, all other things being equal, should have the lower production cost. Isn't it good business, therefore, to know definitely the quantity of water being used per ton of product and the actual cost of delivering it?

Might the added suggestion be made that such information could be obtained and computed easily. All that is required is the installation of water meters of suitable size at critical points in the line of flow.

A Personal Handbook

THERE are handbooks and handbooks, but there are none more valuable than the handbook that is individually made. It may be a handbook for an engineer, master mechanic, chemist, research worker, superintendent or other production executive, or for any other individual in any line of specific work in the mill. The nature of the work and the aptitudes of the individual determine the character of the material it contains.

It may not be any work of art. It may have no index or be arranged in any organized form. It even may not be confined to any set of covers. Yet no other handbook, if properly conceived and executed, can serve the individual so completely and well.

First of all, it is specific—more specific than any published handbook can be. Then, it is personal. These two features make it a work hard to beat.

Maybe it is a compilation of printed information that has been gathered from books, magazines and other forms of literature. Maybe it is based on information gathered simply as a result of actual experience.

Whether compiled out of sheer love of the job or because of actual necessity, the personal handbook becomes an invaluable working tool in the hands of the user. It serves to answer the many problems that come up from day to day in a way that no published handbook, valuable as it is, can hope to do.

The engineer, master mechanic, chemist, research worker, superintendent, or other production executive, as well as any one else in a pulp and paper mill organization who could profit by such a handbook but who hasn't given enough thought, if any at all, to its preparation, has failed to get as much from his work as has been his for the taking. Plenty of material has been made available. It is simply a question of proper selection.

If you could use such a handbook but haven't one, start now to make one. Read critically. Observe critically. Assemble selected data. The compilation will prove its value in a comparatively short time.

TOWMOTOR Gas Operated LIFT TRUCKS

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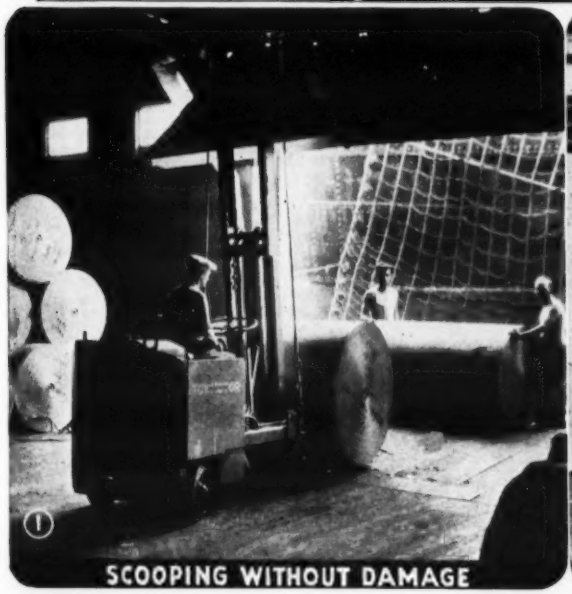

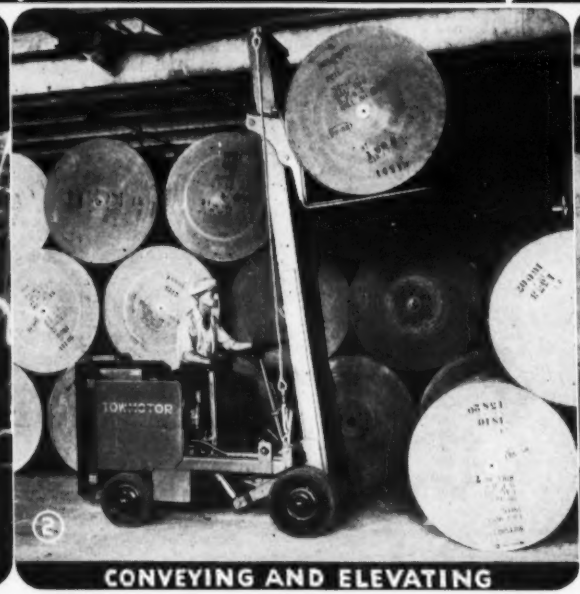

Towmotor straight gas powered hydraulic lift trucks are safer, faster and more economical in handling paper in rolls, cases or most any other form.

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Dual tired driving wheels under the load give better traction. Steering on rear wheels permits short pivot turns. Straight gas powered with unusually rugged construction throughout for greater dependability and 24 hour uninterrupted service. Load capacity and height of lift built to suit requirements. Lift truck shown handles loads up to 5000 lbs. Lowest cost per year is the real cost. Give details of your requirements and we will send prices and specifications to cover.

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It Isn't Too Late . . . Even Yet!

WILLIAM SIBLEY

◆WRITING BACK IN JANUARY, 1926, I told the following story. Johann Haraburda was a Pole who was a bit above the average. He had traveled extensively, but somehow the steerage wasn't broadening. Being characteristically narrow-minded, Ellis Island failed to stimulate him. And he didn't care especially for New York's night life, although he knew it very well. Not perhaps as you and I know it because he saw night life scrubbing floors in a restaurant. His days, for the most part, were spent in bed—a bed that was still warm from the man who slept in it while Johann scrubbed. And the view from his chamber window was not particularly inspiring. Ash cans and garbage containers are seldom a source of inspiration.

Later Johann got a better job. In a steel mill . . . South Chicago. He had a wife and a little girl who also spoke Polish and kept with their Polish friends. Johann got $32 a week at his new job. He liked that. What is more he joined the union. Wonderful thing. The man who got him in as a member said so. He spoke Polish. After a while the unions, all of them, would be consolidated. Just One Big Union. The man had told him. Then he would get better wages. Shorter hours. He would have to work only two hours a day—and his back wouldn't ache. It only takes two hours of labor to earn enough to keep himself, wife and child. That's what the man said. His boss and the bosses in Washington were his natural enemies. They built prisons for the likes of him—on the money he earned for them. That's what the man had told him. Every policeman was a scab and worked for the Washington bosses. Didn't the man say that?

Last week there was a strike. Every man out. The strike was for more money. Scabs tried to come and work in Johann's place. That made Johann mad. It made everyone mad. There was a riot. Johann had a fight—with a policeman—his natural enemy. Johann hurt the policeman. Cut him with a knife. Now Johann is in prison. In the prison they had built for him. His first contact with the "bosses" had proved disastrous. The Salvation Army and a Mission are helping care for the wife and child.

◆SO ENDED THE STORY, in January, 1926. Now, eleven years later, with the One Big Union rapidly becoming a realization through the C.I.O., I wonder just who had the greatest intellect—the Polish labor agitator or the executive who ran the steel mill. Really, the labor union chiefs don't have to be very bright to be the superior of many industrial chiefs. Labor agitators have told their story, over and over again,—in the language best understood by their prospective members. Whether or not they told a distorted story is beside the point. *They told a story*—and that is more than the majority of employers can say. Most employers have been dumb. But more than mere vocal effort, labor agitators never talked over the heads of their prospects; never talked down to them, either. They talked *at* and *with* the men. Therein is lesson number two for many employers, for in that regard those many employers have been dumb in its second and uncomfortable sense.

Public relations has been one of the most sadly neglected activities of all industry. Entirely too many industrialists think of "public relations" and "publicity" in the same breath. In reality they are as different and unrelated as oil and water. They both serve a purpose, but certainly not the same or even similar purpose. And therein many industrialists have made a sad mistake since, in their confusion of the departmental functions they have assigned the job of public relations to a publicity director! As if the purchasing agent could do the chief chemist's work!! Or the advertising manager be also the chief engineer!

Public relations, for the paper mill or the pulp plant, begins right at home—in the mill's own back yard. It is of the utmost importance that every merchant, doctor, lawyer, dentist,—every member of your *local* business and professional group—completely understand and appreciate the benefits and aims of your local mill. Perhaps this applies with less intensity to the mills and paper plants located in large cities like Chicago or Philadelphia. It is in the smaller cities and towns where local community "public relations" are of vital importance. Even in metropolitan centers, however, the problem of local community good will is frequently a great concern.

Over and beyond the outsiders, however, is the mental health of your immediate employees. What the names on your payroll think is a matter that cannot be over-estimated. And what they think depends entirely upon what they know. If they know what the labor union fellows tell them (and that's all) then they know things detrimental to your industrial health. If they also know your side of the wage and production story then their thinking cannot fail to be healthier. If you told every employee (and if you did, you would be telling the truth) that for every man-jack on the payroll, regardless of whether he be a department head, a clerk in the filing room, a mail boy, or a floor sweeper—that *someone* had to pay, cash out of pocket, $10,000.00 before he could get a job in a paper mill—you would probably be telling him something he didn't know before and which would give him ever so slight an understanding of *your* problems. $10,000 in plant investment is the average per man in the paper industry. $11,500 is the average for the steel industry. $4,000 for *all* industry.

If you fail to interpret facts—if you fail to tell your side of the production and wage story—if you continue to be dumb—then there is no one but yourself to blame for such things as C.I.O., a labor government, or insidious taxes.

ADVERTISING PAGES REMOVED

THE PAPER INDUSTRY

A Six-Hour Day in the Paper Industry

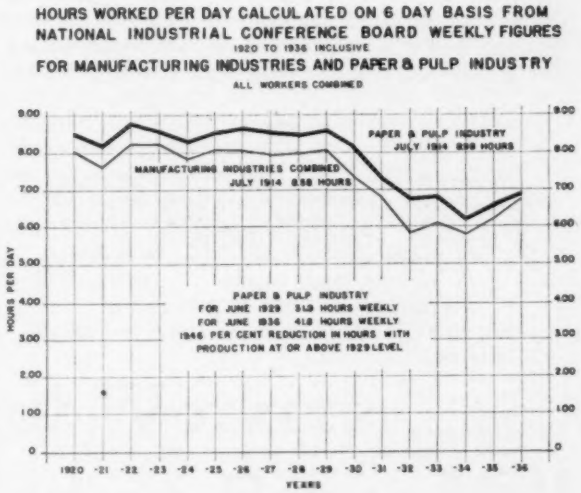
J. P. HAGENAUER, Consulting Engineer
American Paper and Pulp Association

IN THE early days of its history the paper industry in the United States, like all other industries of that day, was subject to the so-called "agricultural day" under which employees worked from sun-up to sun-down. The length of this day was slightly greater in summer than in winter. At an early date the skilled workers, being imbued with the underlying principles of constitutional freedom, equality of opportunity and the pursuit of happiness, grew restless, and after a severe struggle succeeded in obtaining a twelve hour shift.

Having been granted the privilege of suffrage, propertyless workers in the early part of the nineteenth century united their efforts with those of their fellow workers, and the movement for still shorter hours spread rapidly and continued to gather momentum as the country matured. The struggle was a strenuous one. It became apparent very soon that the solution of the problem of hours of work could not be left to the voluntary efforts of employers or to organized labor. Legal regulation seemed inevitable. This situation was attributable on the one hand to the policy of organized labor preferring to reduce hours through collective bargaining, and on the other to the uncertain attitude toward the lethargy of public opinion.

Early legislation was confined mostly to public works and transportation. In 1840, President Van Buren limited by executive order the hours of work in the Government Navy Yards to ten hours per day and an eight-hour day law was passed in 1868 for all laborers, workmen and mechanics in the United States Government Service. The effectiveness of this law was limited until, in 1912, it was amended. With the beginning of the twentieth century the number of legal regulations increased in various states, and the movement received renewed impetus during and shortly after the World War. The depression decreased the length of the work day to a minimum in 1933. Federal legislation through the N.I.R.A. tried to regulate hours to a maximum of 40 hours a week in an effort to increase employment.

In the accompanying figure, there are shown the hours of work, for a day, for comparable mills, cover-



ing a period from 1920 to 1936 inclusive, for the paper and pulp industry, and for all manufacturing industries combined. The close similarity of both curves should be noted; also the fact that the hours of the paper and pulp industry have always exceeded those for the average of all other manufacturing industries combined. However, the margin of excess has been decreasing steadily since the depression minimum of 1933. From a maximum of 8.98 hours in 1914 the average for the paper industry decreased to 8.55 hours in 1920. The figures definitely indicate a tendency toward a shorter work-day, rapidly approaching the six-hour-day. From a maximum of 8.68 hours in 1929, the average hours of work per day have decreased to 6.72 in 1936. This decrease is equivalent to a reduction of 19.4 per cent in hours per day in spite of the fact that the production level of 1936 was as high, if not higher, than in 1929.

The adoption of the six-hour-day in industry must be considered in the light of an experiment for the paper and pulp industry. The survey of mills made in April 1936 showed that out of 208 mills only 56, representing 26.9 per cent of all mills reporting were working on a four-shift day of six hours each. Table No. 1 shows the distribution of these mills by size, and also by product class. The majority of the mills on the four-shift day are to be found in the groups of 100

to 200 tons production per day, and of over 200 tons. The analysis of the distribution of mills is based on machine tenders' hours and covers paper mills only.

For further analysis, certain definite key occupations in the paper and pulp mills have been chosen, and the distribution of employees in these selected occupations, by number of shifts worked, is shown in Table No. 2. Out of a grand total of 24,592 employees, 3,291 or 13.38 per cent are working on four shifts; 4,763 or 19.37 per cent are on three shifts; 1,121 or 4.56 per cent are on stagger shifts; 447, or 1.82 per cent are on two shifts; and 14,970 or 60.87 per cent are on one shift. This covers all occupations selected for the paper mill, pulp mill, power plant, and maintenance department. Out of 2,090 employees in the paper mill on four shifts, 720 or 34.45 per cent are machine tenders; 216 or 10.34 per cent are beater engineers; 40 or 1.90 per cent are super-calender operators; 225 or 10.77 per cent are employed in sheet finishing, and 889, or 42.54 per cent are common labor. Out of 381 cooks in the pulp mill, 193 or 50.65 per cent work on four shifts. Out of 524 grindermen, 204 or 38.93 per cent are on four shifts. In the power plant 436 out of 865, or 50.41 per cent are on four shifts, and in the maintenance department, out of 6,931 employees in various occupations, 368, or 5.31 per cent are on four shifts. From the above figures and an analysis of Table No. 1 it is plain to be seen that to date the six-hour day in the paper and pulp industry applies only to a small proportion of the industry's employees.

Naturally a lot of controversy has risen throughout the country in all industries in regard to the question of a six-hour day. The arguments for and against this shortening of the day were heard when it was proposed to change the twelve-hour day to ten hours, and again, the ten-hour day to eight. In spite of all opposition from both employers and employees it can be expected that the economic trend throughout all industrial countries will gradually force the adoption of this shorter, six-hour day. Violent change is not likely to take place: rather, the change will be a gradual development.

TABLE 1

DISTRIBUTION OF PAPER MILLS WORKING 4 SHIFTS OF 6 HOURS EACH BY PRODUCTION AND SIZE CLASS BASED ON MACHINE TENDERS HOURS

	SIZE CLASS CAPACITY IN TONS PER 24 HOURS					
PRODUCT	10	11–25	26–50	51–100	101–200	200
Groundwood	..	..	..	1	4	1
News	..	..	..	1	1	3
Book	..	..	..	..	..	2
Writing	..	1	1	5	..	..
Kraft Wrapping	..	..	..	..	6	3
Sulphite Wrapping	..	2	1	4	2	3
Tissue	2	3	2	1	..	1
Book	..	..	..	1	1	2
Absorbent	..	1	..	..	1	..
56 Mills	2	7	4	13	15	15

56 Mills out of 208 — 26.9 per cent.

TABLE 2

DISTRIBUTION OF EMPLOYEES IN SELECTED OCCUPATIONS BY NUMBER OF SHIFTS WORKED

	ALL SHIFTS			4 SHIFTS			3 SHIFTS			3 AND 4 SHIFTS staggered			2 SHIFTS			1 SHIFT		
	No. Mills	No. Emp.	Per cent of Total	No. Mills	No. Emp.	Per cent of Total	No. Mills	No. Emp.	Per cent of Total	No. Mills	No. Emp.	Per cent of Total	No. Mills	No. Emp.	Per cent of Total	No. Mills	No. Emp.	Per cent of Total
Paper Mill																		
Machine Room	208	2046	12.87	56	720	34.45	130	1064	25.73	18	253	38.86	2	6	1.36	2	3	0.04
Beater Room	205	997	6.27	46	216	10.34	125	567	13.71	28	206	31.64	6	8	1.81			
Super Calenders	74	438	2.76	8	40	1.90	18	195	4.71	12	145	22.28	3	6	1.36	33	52	0.61
Sheet Finishing	180	6488	40.83	3	225	10.77	20	1492	36.07				8	263	59.64	149	4508	52.58
Common Labor	203	5622	37.27	7	889	42.54	12	818	19.78	1	47	7.22	4	158	35.83	179	4010	46.77
Totals Paper Mill		15891	100.00		2090	100.00 13.15		4136	100.00 26.03		651	100.00 4.10		441	100.00 2.78		8573	100.00 53.94
Pulp Mill																		
Cooks	94	381	100.00	47	193	50.65	30	93	24.41	17	95	24.94						
Grinderman	38	524	100.00	13	204	38.93	16	156	29.77	9	164	31.30						
Power Plant																		
Firemen	201	865		101	436	50.41	54	198	22.89	41	211	24.39	2	6	0.69	3	14	1.62
Maintenance	212	6931		4	368	5.31	4	180	2.60							204	6383	92.09
Grand Total		24592			3291	13.38		4763	19.37		1121	4.56		447	1.82		14970	60.87

It is interesting to summarize the arguments in regard to the shortening of hours. The advocates of the shorter day state that it will increase employment and will raise the general standard of income, giving more leisure with stimulated consumption, thereby helping to advance regularity of trade and production, with consequent greater profit through increased production. It is also stated that more leisure will raise the standard of living and promote greater enjoyment of home and educational facilities. The shortening of hours is said to be followed by increased efficiency of output. On the other hand, those opposed state that the shortening of hours will be followed by decreases in productive capacity, resulting in increased labor and general production cost, with higher prices to the consumer. With the shortening of hours it is to be expected that United States industry would be hampered in competition in world markets with countries having lower production costs. Those against shorter hours also raise the traditional objection that the increase in leisure time for the working class would be followed by an increase in intemperance, idling and moral lassitude. The statement also is made that the effect of shorter hours on employment is uncertain. These arguments, for and against the shorter work day are presented here without comment, but it must be remembered, as stated previously, that the same arguments have been advanced every time the shortening of hours has been proposed.

To return to the paper industry, the problem of a six-hour shift is a multiple one. The six-hour shift in the continuous process operations is far more adaptable and flexible than a fixed forty-hour week. However, in the paper industry we have certain departments and occupations in which eight hours are usually sufficient to handle the output of a twenty-four hour continuous process operation, as, for instance, in the finishing room of a mill. In the case of such a department either two shifts of six hours each would have to be put into effect, or employment in the department would have to be increased to handle the eight hours' work in six. In the majority of mills the latter possibility will be practically impossible as there is not sufficient work space available for additional employment. Of course, the department could be operated on a seven-day basis. This would then require a floating shift which, in cases of smaller mills in rural communities with their lack of skilled labor, presents a problem difficult to overcome. It has been stated that the six-hour shift has resulted in increased efficiency of personnel and that through this increased efficiency the output of the mills has been increased. While the experience with six-hour shifts has been limited to a comparatively small number of mills, it can be stated that the application does not present difficulties or problems which could not be overcome by careful study, and by planning on the part of the mill managers.

Safety for Electrical Workers in a Modern Paper Mill

N. L. DANFORTH[1] and C. E. CENTER[2]

IN A modern paper mill of today with its high voltage equipment, safety of employees plays a predominating part.

On account of the large blocks of power consumed in this industry, energy has to be transmitted at somewhat higher voltages than are found in the more common industries. This puts the paper mill more in the class of central stations and power companies, steel mills, and other heavy industries.

In the paper mill nearly every machine or piece of apparatus is individually driven, either directly connected or close connected. Apparatus using comparatively small amounts of power, say up to and including 100 hp.; may be supplied from 440 or 550 volt lines. From 50 to 1,000 hp. it is not uncommon to use 2200 volts for transmission and distribution; although the dividing line between such practices varies with individual mills. For supplying power to wood pulp grinder, motors of one to four thousand horsepower 6600 volts are sometimes used. This will establish the fact that the voltages about a large paper mill are of a deadly nature if a person accidentally comes in contact with them.

In the older mills, where wood construction was used throughout, a person might contact current-carrying conductors up to 600 volts without severe shock. Now, with mills built entirely of steel and concrete, the conditions are vastly different. Usually the steel work is grounded, intentionally or otherwise. This, coupled with the relatively low insulating qualities of concrete, supplies a good ground if a person accidentally touches a bare live conductor. Thus even 110 volts is a hazard and the necessity for establishing safe working conditions and methods about such a plant is extremely important. The wet and damp conditions prevailing in many parts of the mill increase the hazards.

The main step toward safe conditions is to provide means of enclosing all dangerous current-carrying conductors sufficiently to protect all employees:

1—All wires should be installed in metal conduits or raceways.

2—All switches and bare metal conductors should be enclosed in steel compartments or in grill work accessible only to authorized persons.

(1) Maine Seaboard Company, Bucksport, Maine.
(2) Industrial Engineer, Westinghouse Electric & Manufacturing Co., Portland, Maine.

Fig. 1—Dead front switchboards safeguard electrical workers in modern paper mills

3—All electric motors, starters, switch cases, or any metal compartment used to enclose current-carrying apparatus should be thoroughly grounded.

This last point cannot be stressed too strongly, especially in the higher voltages. The grounding system should be as well done mechanically as electrically that it may give the protection for which it was supplied. Small ground conductors may become broken either due to abuse or vibration; consequently they should be of adequate size and of a standard construction. The connections to earth should be of low resistance and of multiple design. These should be checked periodically unless they are of a nature that cannot change.

All portable electric devices, either single or polyphase, should be supplied with power through a cord which has an additional conductor for grounding purposes. This ground conductor should be permanently and securely fastened to the portable apparatus at one end and preferably should have a connecting plug at the other end which automatically connects it to the mill grounding system when the plug is inserted in its power receptacle. This point is very apt to be overlooked in 110 volt apparatus, but is none the less important as it may prevent serious accident to a workman, particularly if using the tool in a damp place when a fault occurs.

Another point in the safe installation of power equipment is the advisability of using push buttons or remote control. By using this system the operator of any piece of apparatus does not come in contact with any of the high voltage current-carrying parts during the starting operation. This applies especially to high voltage switches, starters, and compensators. Any of these can and sometimes do explode when being operated under short circuit conditions. This of course, is not intentional but can happen due to failure of insulation on wires in conduits or the windings in motors.

Wherever a large quantity of power is used there will be necessarily a large *supply* of power. This means that a tremendous amount of energy is loose to cause destruction wherever a short circuit occurs unless some current limiting device is employed. This is common practice at the lower voltages up to 600, and it can now be done in the higher voltages up to 23,000 volts by means of a comparatively new renewable power fuse now on the market having an interrupting capacity of 600,000 Kv-a at 23,000 volts.

There is definite danger from high voltage disconnect switches as used on motor circuits. The majority of modern disconnect switches will interrupt their rated current safely, but with anything over 600 volts this is impossible without using an oil switch or oil circuit breaker of suitable capacity. Consequently, all disconnect switches on the higher voltages must be provided with some means of locking both in the open and closed positions. Even with this protection there is sometimes man failure with disastrous results. To guard against this, some means of interrupting the control current to the motor starting device should be supplied. It should be a hard and fast ruling that all persons having authority to operate high voltage disconnect switches must first open this control circuit in the prescribed manner before opening the disconnect. This will make it impossible to open the switches while current is passing through them; also the device cannot be started by one person while another is operating the disconnect switches.

Another angle of safe conditions about an electric mill is the possibility of starting any piece of equipment while men are working either on the electrical or mechanical end of the machine. To guard against this, the mill provides a "Hold" tag patterned after those used in central stations. If the work to be done is of a mechanical nature, the mechanic is required to have an electrician open the disconnect switch on the particular piece of equipment and attach one of these tags, properly filled in, to the switch. When the work is completed the electrician must again be called to remove the tag and close the switch. If the work is electrical, all electricians are properly instructed in the proper use of these tags for their own protection. If this particular system is properly followed and enforced it is about 100 per cent efficient.

A watchful eye has to be kept on the man working on electrical circuits. It must always be borne in mind that electricity is a strange commodity; it seems apparently harmless until one comes in contact with it under adverse conditions. For instance, a man should not be sent to work on a high voltage line unless he is an experienced and tried workman whom the foreman is absolutely sure of. Even if he is competent, he should have another man with him to check with him when the apparatus is safe to work upon and to be of assistance in case of accident. This rule should not be abrogated even in depression times when there is a tendency for the management to cut the crews to skeleton forces. All new workmen should be trained in the fundamentals

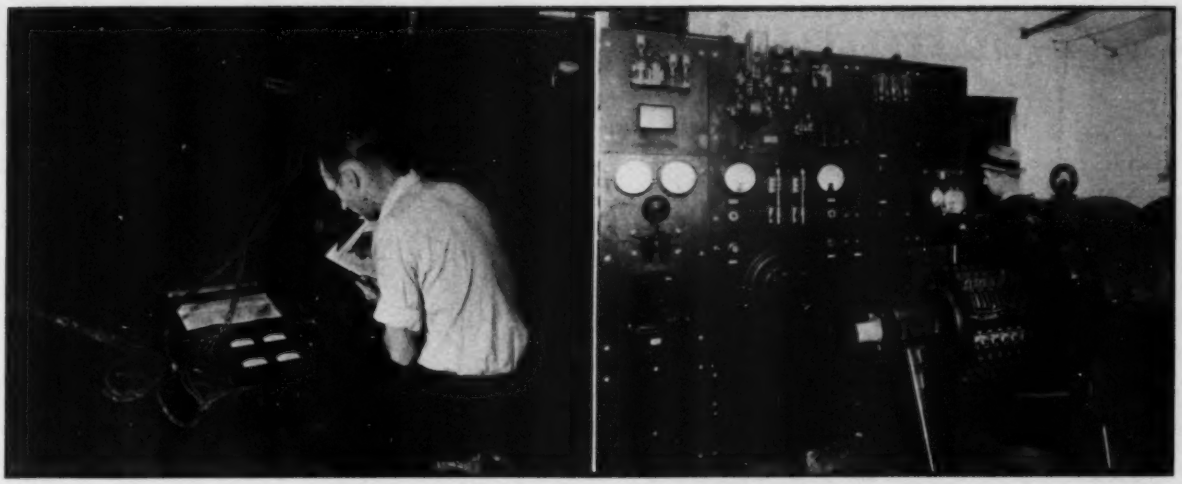


Fig. 2—Load tests are made with dispatch and safety in many mills by means of this kit. Since the meters are all wired up, only external connections are required, decreasing hazard and erroneous readings. Fig. 3—Electronic speed regulators increasingly used in paper mills, have special features to aid safe and easy inspection. To facilitate tube testing a voltmeter on the regulator can be plugged into the various tube circuits without removing tubes from their sockets

of safe practice both by foremen and crew mates until they become instinctive.

To assist the men in working on strange circuits, the mill uses an instrument called the Statiscope. This device will indicate to the workman whether or not the line or wires he proposes to work upon are energized or not. Here again he cannot be too careful as the instrument may become damaged or broken, but there is seldom a time when the man cannot test it on some live part nearby to check its accuracy. Another instrument is provided for testing circuits up to 600 volts a.c. or d.c. This is compact and no harm can result from applying it to any circuit within its rating. It is small and cylindrical in shape and shows by a suitable indicator approximately what the voltage of the circuit is to which it is attached. This is much safer than the test lamp method as with the latter the workman may, through error, apply a 110 volt lamp directly to 440 or 550 volts with the result that it will probably explode and possibly blind him to say nothing of causing other injury through burns or shock.

Each competent electrician should be provided with his own individual set of rubber gloves of suitable rating. These gloves should be called in at regular intervals to be put through a rigid test and inspection to keep them at a high standard.

Illumination plays an important part in the safe operation of any plant. One could well write a complete article on this subject, but it will suffice to say that adequate illumination in all parts of the mill conforming to recognized standards will amply repay the initial cost of installation.

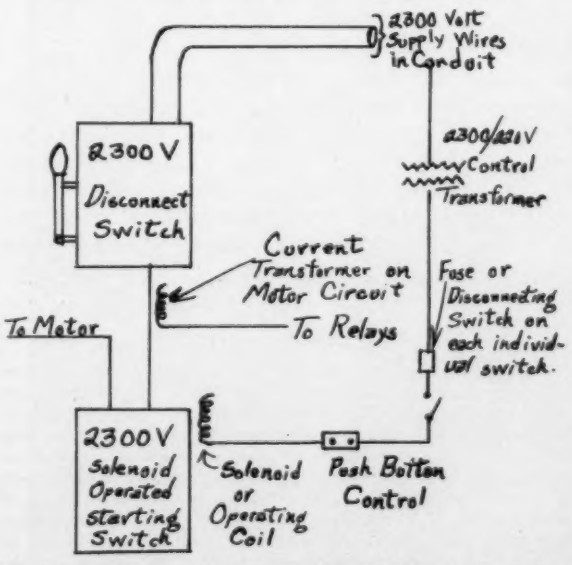

2300 Volt Supply Wires in Conduit
2300 V Disconnect Switch
2300/231 V Control Transformer
Current Transformer on Motor Circuit
To Relays
To Motor
Fuse or Disconnecting Switch on each individual switch.
2300 V Solenoid Operated Starting Switch
Solenoid or Operating Coil
Push Button Control

Fig. 4—Simplified schematic diagram of typical power supply for paper mill

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Plan Further Research on Safety Film

At a meeting of the committee held at the New York Public Library, February 26, 1937, plans were formulated for further research on problems connected with the use of the new documentary material—motion picture film.

The past research in the paper section of the Bureau has shown that the cellulose acetate type of film, commonly termed "safety film," if properly made, apparently has stability commensurate with that of the best permanent record paper, providing it is kept under conditions suitable for its preservation.

Some of the unique problems still facing the film user are the effect of the heat and light of the projection apparatus, and scratching of the emulsion in the projection process. Treatments to harden the emulsion or otherwise protect it against the effects of wear have been developed by various investigators but little is known of their efficacy. Means to overcome the shrinkage of films with aging need to be found. The fineness of grain of the emulsion needed for clear reproduction of old faded documents requires study. New types of films are being developed for this specific use, and each may present new problems.

Silvicultural Methods

for Reforestation with Hybrid Poplars

ERNST J. SCHREINER*

DURING the past ten years the writer has been engaged on special studies in connection with experimental plantings which, it is believed, indicate the methods necessary for the successful establishment of poplar plantations. Poplars, suitable for cellulose, paper pulp, and other less extensive uses such as matches, excelsior, and treated posts, are among our fastest growing forest trees and offer a forest investment of comparatively short turnover. Growth studies on existing hybrid poplars growing in New England and eastern Canada indicate the probability of a rotation of 20 to 25 years with a total yield of about 30 cords per acre.

BEST POPLARS FOR FOREST PLANTING

The native aspens *Populus tremuloides* and *P. grandidentata,* and the Northern balsam poplar *P. tacamahacca,* are relatively slow-growing species. The Northern necklace poplar *P. balsamifera virginiana,* the fastest growing poplar native to the Northeast, is not as vigorous under identical growing conditions as some of the commonly cultivated hybrid clones, such as the *Eugenei Poplar,* the *Generosa Poplar,* and the *Robusta Poplar.* Hybrid poplars are preferable for forest planting not only because of their greater vigor, but also because of their better rooting ability, and in some instances because of their greater resistance to disease.

In 1924, Dr. A. B. Stout and the writer started on a project for the hybridization and selection of poplars; the results of this hybridization work have been reported in several previous publications (*3, 4, 6, 7*). This work has been carried on by the Oxford Paper Company with the co-operation of the New York Botanical Garden. A total of over 13,000 hybrids have been produced, and of this number about 60 have been selected up to the present time as representing the best from the standpoint of vigor of growth and resistance to diseases. Ten of these selections have been described under clonal names (*4*) and have been widely distributed for trial culture.

PROPAGATION OF POPLARS FOR USE IN REFORESTATION

The inherent qualities of a hybrid can be maintained by vegetative propagation, that is, by the establishment of a clone. In the case of poplar hybrids cuttings from one-year-old sucker shoots provide the cheapest method of propagation, but there is a marked variation among poplar species, varieties, and hybrids in their ability to root from cuttings. *Populus tremuloides* and *P. grandidentata* root with difficulty, ordinarily giving less than a one per cent catch under favorable nursery conditions. Many of the hybrid poplars, such as the *Eugenei* and the *Robusta,* root practically 100 per cent with proper selection of cutting stock and care in handling of the cuttings. Other poplars such as *P. balsamifera virginiana* (the necklace poplar of the Northeast), *P. tacamahacca* (the native balsam poplar), and *P. Maximowicsii* (the Chinese poplar) range between these extremes. In considering a reforestation project with poplars it is therefore essential to know the rooting ability of the species or hybrids to be used. When the poplar project was first undertaken, cuttings were calloused previous to planting but this process did not appear to improve rooting to any appreciable extent. It is possible that with some specific treatment (chemical or otherwise) cuttings of poplars low on the rooting gradient might be rooted more successfully. This field has not been investigated because the most vigorous hybrids which have been tested up to the present time have all rotted readily from cuttings.

Cuttings of two native poplars, *P. balsamifera virginiana* and *P. tacamahacca,* were obtained from sprout growth on cut-over woodland for the first experimental plantings, but hybrid clones were propagated in the Oxford Nursery established by the Oxford Paper Company at Frye, Maine. It is located on low, so-called "interval" land, and the soil is a fairly light, sandy loam which had been in grass for many years and contained very little organic material. The rainfall in this region is sufficient to give an excellent catch and vigorous growth from cuttings in the nursery.

Planting Cuttings in the Nursery

Cuttings varying in length from 10 to 20 inches were originally tried for nursery planting, but 12 to 14-inch lengths were found most satisfactory. The land upon which cuttings are to be planted is plowed to a depth of 8 to 10 inches. The cuttings are planted 10 inches deep by pushing them into the ground or, if the ground is too hard, by pushing the cuttings into holes made with a foot-dibble. This tool, fitted with a wooden han-

(*) *From 1924 to 1935 Mr. Schreiner was with the Oxford Paper Company, Rumford, Maine, as Research Forester. He then spent a year with the Tree Crop Unit of the Forestry Division, Tennessee Valley Authority, initiating and in charge of forest tree breeding and forest-genetics research. Since October, 1936, Mr. Schreiner has been connected with the Forest Service at the Northeastern Forest Experiment Station as forest geneticist, starting, and in charge of, a new project in forest genetics for the northeastern region where he continues to co-operate with the Oxford Paper Co. in continuing the poplar research.*—Editor's Note.

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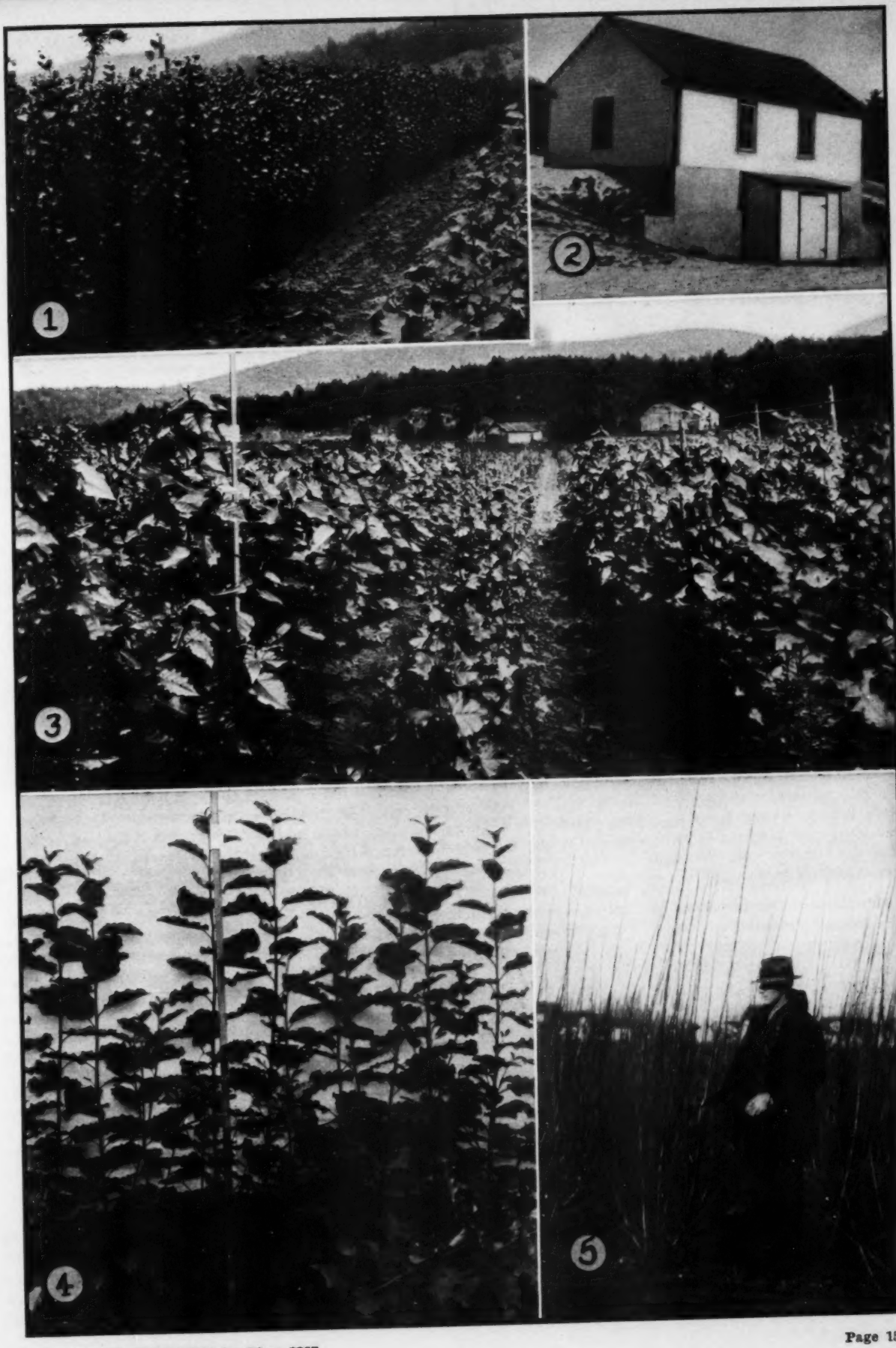
Cuttings and rooted trees of the hybrid poplars can be produced in large quantities at the Oxford Nursery located near Frye, Maine. The vigorous growth from cuttings of hybrid poplars planted in the nursery is shown in Photographs No. 3 and No. 4, taken in late August. These trees are used as rooted stock for planting on forest land. A row of 3-year-old plants cut back annually for the production of cuttings is shown in No. 1. Photograph No. 4 was taken in late fall when the whips are cut for storage in the cellar shown in No. 2, to be cut into 12- and 20-inch lengths during the winter. Photograph No. 5 shows nursery stools cut back annually over a period of 12 years.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The crews in Photographs No. 6 and 7 are planting rooted trees and cuttings respectively, on cut-over forest land on which the weed trees had been cut during the slash burning operation

dle, has a tapered steel point 12 inches long with a cross piece at the upper end. The soil is then tamped firmly with the foot in order to eliminate air spaces around the cutting. In recent years cuttings have been set into narrow trenches about 10 inches deep made with a horse drawn trencher. This has reduced the cost of nursery planting considerably, and it is expected that the trencher can eventually be adapted for complete machine planting in the nursery.

Production of Cutting Stock and Rooted Trees

Cuttings or rooted trees that are planted in the nursery for continuous production of cutting stock are spaced 18 to 24 inches in rows 4 feet apart. Such plants are cut close to the ground every fall and the shoots which are removed provide the cuttings necessary for field and nursery plantings. The maximum production of cutting stock is reached when the roots are about 3 years old, and after this age production is maintained at a rather uniform rate. The writer has seen roots cut back annually for a period of 12 years on which the production of sucker shoots had not begun to fall off appreciably.

Forest plantations of poplars can be successfully established on moist sites by means of dormant cuttings, but dryer areas required the use of one-year-old rooted trees. Such rooted stock is grown in the nursery from 14-inch cuttings planted as described above, at 8 to 12-inch intervals in rows 3 feet apart. Cuttings in nursery rows are cultivated with a two-horse cultivator until the growth is too tall to permit the use of this implement without injury to the young stems. Weeds are kept out between the plants by hand hoeing.

Handling of Dormant Planting Stock

Storage Cellar. It has been found necessary to store cuttings at a temperature below 36 deg. Fahr. in order to keep them dormant until they are planted, and to prevent the spread of canker diseases. The concrete storage cellar at the Oxford Nursery has three bins, with drainage facilities and upper and lower ventilators. A long vestibule extends across the front of the bins, and a small shed built out from the concrete wall is used for temporary storage during the planting period. The walls and ceiling of this shed as well as the ceiling of the cellar are packed with 4 inches of dry sawdust. The temperature of the storage bins usually remains well below 35 deg. Fahr. up to the time planting is started, but during the 3 to 4 week planting period, when the cellar is opened daily, it is necessary to keep ice on the sand covering the dormant planting stock.

Cuttings. The sucker growth intended for cutting stock is cut close to the ground during late October and early November. The shoots are tied in bundles of convenient size and are set upright in the storage cellar with a foot of moist sand packed around the butts. During the winter they are cut into 12 and 20-inch cuttings which are tied in bundles of 100 each and stored in layers separated by 2 to 3 inches of moist sand. By means of suitable shelfing an air space is left between every four layers of cuttings to prevent heating. The sand covering the cuttings is kept moist during the entire storage period.

Rooted Trees. One-year-old rooted trees are usually dug in late October and November, heeled-in in a shaded location in bundles of fifty, and are covered with a layer of hay after each of the first two or three snowfalls. Rooted trees stored in this manner can be kept dormant until the middle of June, but if they are to be used for early planting the top layers of hay must be removed as they thaw.

EXPERIENCE IN REFORESTATION WITH POPLARS

Experimental field plantings have been made with two native species, *P. balsamifera virginiana* and *P. tacamahacca*, and with five commonly cultivated hybrids, the *Eugenei, Robusta, Regenerata,* and *Generosa poplars* and a type called *Norway poplar.* These poplars were used because cutting stock could be obtained in fairly large quantities before the new hybrids were developed or propagated.

The experimental plots include abandoned farm land and cut-over hardwood and softwood areas, and range from flat river bottom to very steep hillside sites. The trees in all plantations have been spaced six by six feet. Possibly a wider spacing may be more desirable but definite data on this point will not be available until the plantations mature. Approximately fifty sample pots have been established with a total area of about 225 acres. The individual plots, varying from one to twenty acres in area, represent a wide range of site and planting conditions.

Planting Method

The men in the planting crew (from 4 to 10 men, depending upon the size of the area to be planted) work abreast of each other. When planting dormant cuttings each man carries a foot-dibble with a 12- to 14-inch point and a bundle of cuttings. A foreman can usually handle two or three crews, keeping the men supplied with cuttings and periodically checking up to see that the cuttings are well planted. Rooted trees are planted in holes made with a mattock; in this case the men work in pairs, one man digging the holes and the other planting the trees.

Use of Cuttings and Rooted Trees

From a financial standpoint cuttings should be used as extensively as possible for field planting because the cost of cuttings as planting stock and the labor cost in forestation planting is much less than for rooted trees. Cuttings 10, 14, 18, 20 and 30 inches in length have been used for field planting. Although 10 and 14-inch cuttings rooted reasonably well their height-growth during the first year was often insufficient to compete with the natural sprout reproduction on cut-over forest land. Thirty-inch cuttings could very seldom be planted over 10 to 14 inches deep and the tops of such cuttings almost invariably became infected by canker disease. The 18- and 20-inch cuttings have given uniformly better results than shorter or longer lengths.

Results on numerous experimental plots have indicated that the limiting factor for the success or failure of cuttings is soil moisture. Cuttings 18 or 20 inches long have given a catch of from 70 to 95 per cent on sites which retain their moisture until mid-summer. Dryer sites such as sandy knolls and steep inclines with a rapid runoff have been successfully planted with one-year-old rooted trees. The proportion of land which is too dry for the successful establishment of cuttings is probably not over 25 per cent of the forest area suitable for poplar reforestation in the vicinity of the Oxford Nursery.

Results on Abandoned Farm Land and on Cut-Over Forest Land

Abandoned Farm Land. Experimental plantings have been made on abandoned farm land with both cuttings and one-year-old rooted trees. The poplars were planted directly in the sod, in spots from which a sod not less than one foot in diameter had been removed, and in single plowed furrows. The catch in all cases was less than 70 per cent at the end of the first year, and the spots and furrows from which the sod had been removed were almost entirely overgrown with grass. After three years less than 10 per cent of the trees were living and these had grown only six inches to two feet in height. Seven years after planting very few trees remained in the plantations on sod land; the best of these was only nine and one-half feet in height.

Poplar plantations could probably be established on grass land by cultivating the trees for several years or by planting three- or four-year-old trees. This latter method is used in France *(5)* but under present conditions in Maine neither of the procedures mentioned above would be economically feasible for large scale planting.

Cut-Over Forest Land. Excellent results have been obtained on cut-over forest land planted in the spring following the logging operation. Where the soil moisture has been sufficient the catch from 20-inch cuttings planted on cut-over forest land has varied from 80 per cent to 95 per cent.

Cuttings or rooted trees planted on hardwood or mixed hardwood-softwood sites at the beginning of the first growing season after logging grew vigorously enough to keep pace with the natural reproduction, but when a year had elapsed between logging and planting, the sprout hardwood soon overtopped and suppressed the poplar. Although pure softwood land can be planted several years after logging, since natural reproduction from seed is comparatively slow in Maine, the growth of the planted poplar has been very poor on pure softwood sites. An attempt to establish poplar on cut-over hardwood land two years after logging, by cutting the sprout growth with bush scythes, was expensive and unsatisfactory. The growth from the cut stubs was earlier and more vigorous than the original sprout growth on such land and the poplars were lost after the second year.

Causes of Failure and Poor Growth On Cut-Over Forest Land

Forestation plantings have been made both in the spring and in the fall of the year. Fall planting would be advantageous from the standpoint of labor distribution since it would extend the annual planting period in western Maine approximately three to four weeks. However, experimental fall plantings over a period of three years failed, because of the susceptibility of the poplars to frost heaving and to disease during their dormant period.

The growth of the planted poplar has been poor on many of the experimental plots where the original catch was excellent. The factors contributing to poor or irregular growth on such experimental areas can be grouped as follows: unsuitable stock, poor cuttings or trees; careless planting; factors inherent in the planting site.

Unsuitable Planting Stock. The kind of poplar planted may be the limiting factor for successful forestation. Poplars of poor vigor are usually overtaken and eliminated by the natural reproduction on hardwood sites. Types which do not root readily from cuttings under field conditions (for example the Chinese poplar, *P. Maximowiczii*) usually grow poorly during the early years and produce very irregular stands.

Cuttings less than ¼ inch in diameter, tip cuttings, and large basal cuttings (one inch or over in diameter) have given poor results when used in forestation plantings. Poorly rooted one-year-old trees, or rooted trees that have been carelessly dug with a resulting loss of fine roots, have likewise shown a marked loss of vigor when planted on the drier sites. Cuttings or rooted trees that are not entirely dormant when planted (usually apparent from the much swollen buds) and cuttings or rooted trees that have been exposed and allowed to dry out to some extent before planting, also fall in this classification of poor planting stock.

Careless Planting. Cuttings and rooted trees have been purposely planted in a careless manner on small

The cut-over forest land in Photographs No. 8 and No. 9 is ready for planting. The slash has been burned and the weed trees have been girdled. Photographs No. 10 and No. 11 were taken in late July, on an area planted in May of the same year with 20-inch cuttings of the *Eugenei Poplar*. The tree in No. 10 is representative of the best growth on this area.

sample plots; such plantings always failed or at best gave a very irregular catch. Cuttings and rooted trees must be planted sufficiently deep (12 to 14 inches) and must be tightly tamped. In forest planting the workman should be required to use considerable judgment in choosing the particular spot in which the individual tree is planted. It is often possible to plant in slight depressions, where moisture conditions may be advantageous, without materially changing the desired spacing. Carelessness is indicated by planting in rotted stumps, on decayed logs and local high points.

Factors Inherent in the Planting Site. In western Maine cuttings do not succeed on dry sites unless the early summer is unusually rainy. Between the dry sites upon which rooted trees must be used and the moist sites where cuttings give an excellent catch, there are "marginal sites" upon which cuttings will succeed if they are planted very early so that the cuttings will be well established before mid-summer. Such marginal land should be planted with cuttings at the beginning of the planting season. If this is impossible rooted trees must be used.

The various poplars which have been used for forest planting in western Maine have grown rather poorly on wet, swampy ground. This has been true on swampy hillsides with good drainage as well as on flat swampy ground with poor drainage.

Poplars planted on land from which a pure softwood stand had been removed grew well during the first two years, but by the end of the fifth year there was a decided decline in vigor and percent survival.

Poplars are apparently intolerant to both root and crown competition. On cut-over land where the wood has been brought together into yards (cleared areas), such cleared areas have almost invariably produced a fairly heavy sod during the first growing season after logging. Poplars planted in these yards have been noticeably retarded in growth by the more or less complete sod cover.

Preparation of Cut-Over Forest Land for Planting

Slash Disposal. Experience in Maine indicates that cut-over forest land must be cleared of slash to make careful planting with poplars physically possible and that weed trees must be cut or girdled to eliminate shading of the planted trees. Various methods of slash disposal have been tried. Burning in early spring, as soon as the cut-over area is clear of snow, appears to be the most economical and satisfactory method for handling both softwood and hardwood slash. If the slash on the edges of the area is piled and burned while there is still snow in the standing timber adjoining the cut-over land, the interior of the area can be safely cleared by piling and burning, by broadcast burning, or by a combination of piling and broadcast burning.

Elimination of Weed Trees. Weed trees left after logging can be cut and burned with the slash, but the cheapest method of eliminating large trees is by girdling. This operation, usually carried out during the winter, consists in girdling the circumference of the tree with deep oblique axe-cuts. The frost tends to open these cuts and so lessens the possibility of healing during the next growing season. Although the girdled trees die within a year or two they remain standing for several years and are broken down gradually without serious injury to the plantation.

CONTROL OF POPLAR DISEASES

Although poplars are very susceptible to several diseases, adequate methods of control are possible. Rust disease caused by *Melampsora medusae* and related species is especially serious on some poplars and results

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These photographs were taken in comparable 7-year-old plantations on forest land. They represent the best growth made by the older, commonly cultivated hybrid poplars (Photographs No. 12-No. 15), and by three of the new Oxford hybrids (Photographs No. 16-No. 18).

No. 12—*Eugenei Poplar*:—d.b.h. 2.5 inches; height 22 feet.

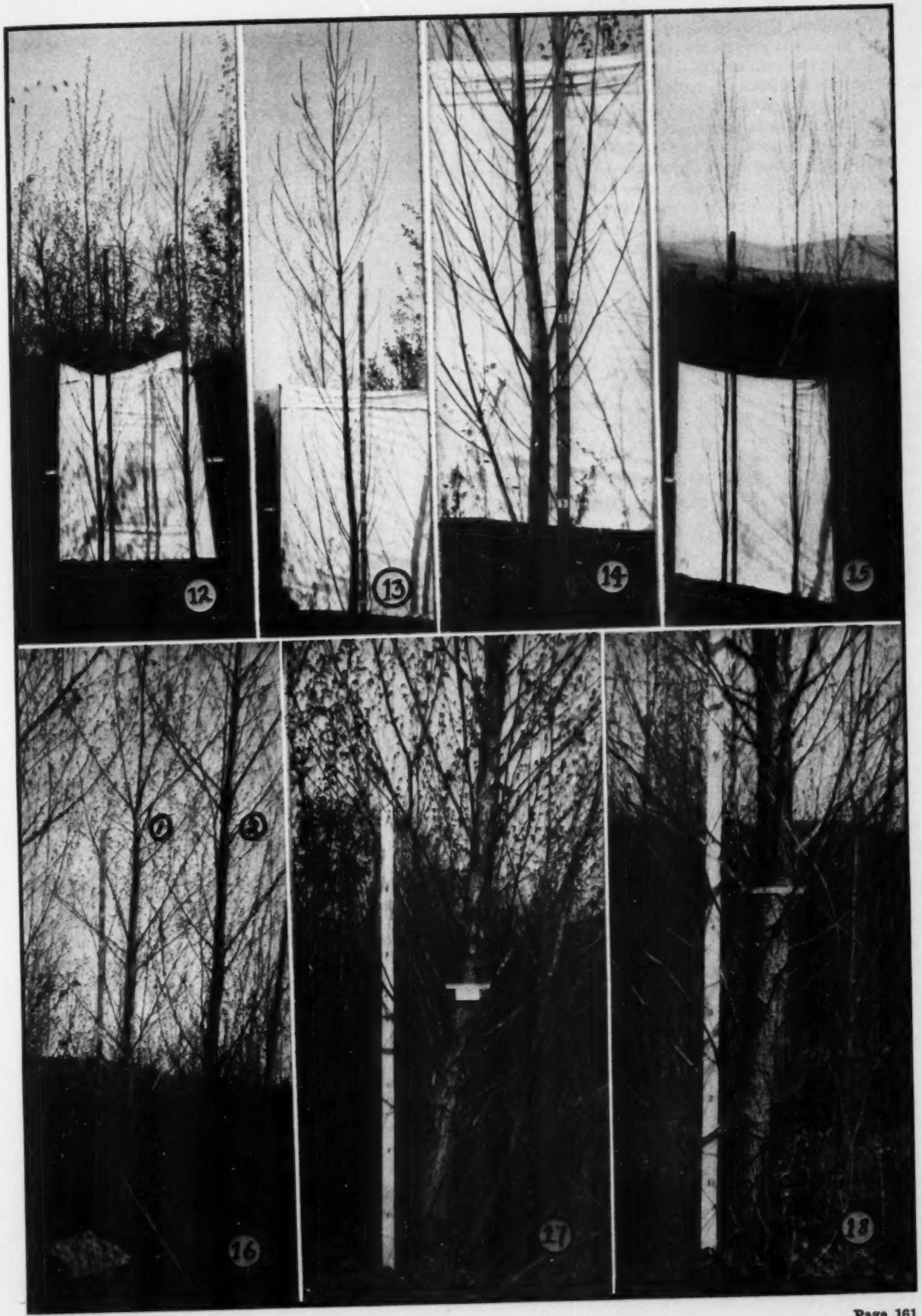
No. 13 and 14—*Eugenei Poplar*:—d.b.h. 3.3 inches; height 25.5 feet.

No. 15—*Norway Poplar*:—d.b.h. 2.25 inches; height 21 feet.

No. 16—Unnamed Hybrid Poplar (*P. balsamifera virginiana* ♀ X *P. trichocarpa* ♂). Tree No. 1—d.b.h. 5.4 inches; height 30 feet. Tree No. 2—d.b.h. 4.7 inches; height 28 feet.

No. 17—*Strathglass Poplar* (*P. nigra* ♀ X *P. laurifolia* ♂): —d.b.h. 5.8 inches; height 31 feet.

No. 18—Unnamed Hybrid Poplar (*P. balsamifera virginiana* ♀ X *P. trichocarpa* ♂):—d.b.h. 5.8 inches; height 30 feet.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in weakening highly susceptible plants to such an extent that growth is greatly retarded. In some cases severe infection for two or three years results in the death of the plant, usually from secondary infection or winterkilling. Nursery stocks of the hybrid clones *Eugenei, Generosa, Robusta,* and *Regenerata* have all been highly susceptible to rust, and growth has been seriously retarded. Spraying would probably control this disease in the nursery, but obviously such measures would not be possible in extensive forest plantations. The elimination of rust diseases from forest plantations will necessitate the use of poplars that are not susceptible to the disease. Fortunately, a considerable number of the most vigorous hybrids produced in the breeding project have so far been practically immune to rust.

The canker diseases caused by *Dothichizapopulea, Valsa sordida,* and *Valsa nivea* (*1, 2*) cause extensive losses in plantations where growth is slow, and also in dormant cuttings if the storage temperature rises above 35 deg. Fahr. In the first year of this work 10,000 cuttings of a hybrid, purchased under the name of "Sudden Sawlog Poplar" from a commercial nursery, were stored in moist sand in an ordinary potato cellar. Canker disease spread through this stock to such an extent that only 200 cuttings were living at the time of planting, and of this number over half were so badly infected that they failed to survive the first growing season.

It has been found that dormant cuttings and rooted trees in storage can be kept practically free from canker diseases by maintaining the temperature throughout the storage piles below 35 deg. Fahr. Canker diseases in forest plantations are best controlled by planting and silvicultural practices which are conducive to vigorous growth of the planted trees. Selection of vigorous planting stock, care in handling cuttings and rooted trees to prevent drying, careful planting, selection of land suitable to the growth of poplar, elimination of weed trees to prevent shading, have been found to materially influence resistance of the planted trees to canker disease.

A twig disease caused by *Fusicladum tremulae* is rather common on the native aspens in New England. This disease has not been observed on any hybrid poplar growing in the Oxford Nursery except a group of individuals of poor vigor having the native large toothed aspen *(P. grandidentata)* as a male parent.

There have been slight losses from poplar borers both in the nursery and in the field plantings. The satin moth, apparently an imported defoliator, is considered a serious factor in the heavily infested areas of New England, but the insect has not yet appeared in the Oxford Nursery or in any of the forest plantings. Insect damage has been of little importance in the nursery and plantations up to the present time.

NEW HYBIRDS OF PARTICULAR VALUE FOR REFORESTATION

Reference has been made to previous publications on the scope and results of the project for hybridizing poplars in connection with which these silvicultural investigations were made. Many of the new hybrids appear especially desirable for forestation planting.

Some of these new hybrids are decidedly more vigorous than the commonly cultivated poplars that were used in the experimental plantations. The best of these new hybrids in eight-year-old forest plantations were from 30 to 35 feet in height and from 6 to 7.5 inches in d.b.h. (diameter 4½ feet above the ground). The maximum growth of the *Eugenei Poplar* in comparable eight-year-old plantations was 30 feet in height and 4 inches in d.b.h. The so-called *Norway Poplar* attained a maximum growth of 26 feet in height and 2.9 inches d.b.h. in 8 years, and the best growth of the *Regenerata* and *Robusta Poplars* in the same period was less than 20 feet in height and 2.5 inches in d.b.h.

SUMMARY

The native poplar species are less desirable for forestation planting than the hybrids commonly used for forestation purposes in Europe. The new hybrid poplars produced by the Oxford Paper Company are even more promising for use in forest planting in Maine than the best of the older hybrids.

Most poplars can be readily propagated by means of cuttings from one-year-old sucker shoots. Large scale production of poplar cuttings and rooted trees for forestation planting is a relatively simple and cheap operation. Cuttings are produced to the best advantage on plants that are grown on cultivated land and are cut to the ground each fall. Rooted trees for forest planting are obtained by growing 12-inch cuttings in a nursery for one year.

Special precautions are necessary for carrying planting stock, cuttings or rooted trees, over the winter. Such stock must be kept from drying out and the storage temperature must be kept below 35 deg. Fahr. to maintain dormancy and to prevent the spread of canker diseases.

Forest planting experiments have been carried out in Maine with the older hybrids, the *Eugenei, Robusta, Regenerata, Generosa* and *Norway Poplars,* of which cutting stock was available in relatively large quantities. Plantings of very limited area have also been made with the new poplar hybrids produced in connection with this project.

The results obtained on the experimental planting plots indicate that in Maine at least:

(1) Under present conditions forest plantations of poplar cannot be economically established on grass land (abandoned farm land).

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(2) Excellent stands can be established on cut-over forest land, cleared of slash and weed trees and planted in the spring following the logging operation.

(3) 20-inch cuttings can be used successfully on moist sites but rooted trees must be used on dry areas.

(4) Planting stock must be carefully selected, carefully handled, and carefully planted.

(5) It is necessary to use poplars most resistant to disease and to employ silvicultural methods that effectively control such diseases.

In Maine, the best of the new Oxford hybrids have grown to a height of 30 to 35 feet and a diameter of 6 to 7.5 inches at 4½ feet above the ground in 8 years. The best of the older hybrids in comparable eight-year-old plantations have reached a height of 30 feet and a diameter of 4 inches at 4½ feet above the ground.

Cotton Versus Asbestos Dryer Felts

A. G. TATNALL
Wm. E. Hooper & Sons Co.

I HAVE been working with the paper industry for so many years that I feel almost as though I were a part of it. *Almost,* though, and not quite—so that I still have a detached view-point. Ordinarily, this would mean that I am not so close to the *trees* that I can't see the *woods;* but maybe in the case of a subject such as the title of this article, my detachment merely helps me to see that there just *aren't* any woods! For, from where I stand, this problem certainly seems to be *all trees*—that is, separate almost unrelated cases and experiences which, for the most part, simply cannot be translated into average results or general conclusions of any particular significance.

During the past several years, I have seen many reports showing the results of comparative tests made with cotton and asbestos dryer felt in individual plants. I have read and heard many expressions of opinion by paper mill men who based their conclusions on actual experience with either cotton or asbestos—or both—in the particular plant or group of plants with which they were connected.

All these reports and opinions have been interesting and many of them have been enlightening. Yet I doubt whether, either separately or as a whole, they can be interpreted in general terms. Sometimes, in fact, I almost doubt whether there can be any such thing as an *average* condition or an *average* result or conclusion in connection with any aspect of dryer felt operation. The darn thing is somehow like personalities or fingerprints: it just won't "average up!"

There are many reasons why this is true. For example, take the two general products themselves. Superficially, any comparison of "Cotton Dryer Felt" and "Asbestos Dryer Felt" would seem to be a comparison of one fabric with another. Yet a cotton dryer felt isn't one fabric, but a number of fabrics and I am not referring merely to the many variations that naturally result from individual production methods and conditions. There are several distinct general types of cotton dryer felts distinguished by weight or weave, or both, and each one seems to best meet certain requirements or sets of requirements as determined by experience. And there is obviously more than one definite type or construction of asbestos dryer felt.

Consequently, we could hardly take sides intelligently in any controversy over "Cotton Versus Asbestos Dryer Felts" until, for one thing, we knew *which type* of cotton dryer felt was under consideration. Then, of course, we would have to know, not only which paper mill is being considered, but which machine with what drying and ventilating equipment—and on what kind of paper. Finally, should we list all these "whiches" and "whats" in some convenient questionnaire form—as has been done many times before now—would our question be answered? Maybe—but only for that one type of cotton dryer felt on that one machine with the specified equipment making the given kind of paper in that certain mill at that particular time! Yes—and I do mean only "maybe" too!

However, I have almost forgotten something that is important! I should have presented my credentials at the very outset—or, at least, have qualified in some way as an impartial witness. All I can say is that there may seem to be some evidence of bias in the fact that my associates and I have pioneered in the development of different types of cotton dryer felts. But this should be counterbalanced by the fact that, for some time now, we have been just as diligently pioneering in the proper design and construction of asbestos dryer felts.

As a matter of fact—and here I am back on the main road again—this dryer felt business is the "pioneering-est" occupation anybody could want. Almost every mail seems to bring some kind of invitation to blaze a brand-new trail!

Why is this true? Well, frankly, we don't yet know all the answers; and, sometimes when I look in the mirror at what used to be my dark brown hair, I don't think we ever will know them all.

Occasionally, too, in our search for specific facts, we draw a complete blank. For example, there was the case of that large mill that had standardized on a certain type of cotton dryer felt and was getting very good performance and life, year in and year out.

Then, one day, we received a letter from the superintendent. No, he didn't want to know what was the matter with that last blankety-blank lot of dryer felts he got. On the contrary, believe it or not, he wanted to inquire why one of those felts was so doggone much better than any he had ever used before. This particular felt, said the superintendent's letter, had already been running some five months longer than normal and was apparently still good for at least a few more weeks.

"Why?" was, of course, the superintendent's inquiry. And, said he in conclusion, if we could answer that question, would we please make all his future dryer felts that same way!

A perfectly natural question and an entirely normal expectation; but we doubt whether Sherlock Holmes himself, even after years of experience with dryer felt operation, could have turned up a major clue. We tried to find the answer, and *how* we tried! but, to this day, for all we know of the real cause of its supernormal behavior, that one dryer felt may have been either charmed or bewitched!

Then there was the time we were paid a special visit by another superintendent who was a customer of long standing. He was a man who not only knew what he wanted when he wanted it, but who usually succeeded in getting it by virtue of an exceptional record on a big-time job.

He had been conducting some experiments of his own with dryer felts—and wanted us to make up a trial lot to his own original specifications. A more open weave was what he wanted for his particular conditions —notwithstanding our conviction that anything but a more open weave was what he needed.

A customer may not always be right, but he's right enough when, as this superintendent did, he agrees to accept full responsibility for what he orders. And the funny part of it was that, customer or no customer, he *was* right, and his special dryer felts made good in every respect! In fact, they're still making good, notwithstanding the fact that, after several years, we have never encountered another set of conditions under which they would give completely satisfactory service!

We could go on indefinitely with similar true stories about asbestos dryer felts as well as cotton dryer felts. Suffice it to say that the sum total of scores of experiences of this kind has fully convinced me that, like all the other characteristic phases of paper mill operation —only more so!—dryer felt performance lends itself to very little safe generalization.

It is true that, on machines operating at very high speeds and in mills where, for one reason or another, continuous forced production is the rule, asbestos *sometimes* offers definite advantages. High speeds or overloading frequently necessitate either running the dryer felts wet or using an abnormal amount of steam and heat. In the case of the average cotton felt, wet operation naturally increases the stretch and, consequently, can result in loss of production, as well as in increased labor costs for changing of felts. Excessive heat will, of course, have less effect on asbestos felts than on cotton felts.

However, if the machines have the proper drying capacity for both top and bottom felts, if they are effectively ventilated and hooded, and, certainly, if they are also equipped with an efficient modern air system to aid in removing steam and moisture—there may be an advantage in the use of cotton in high-speed and in "forced" operation. I mean, of course, *sometimes!*

This question of equipment is particularly important in kraft and board mills where continuous operation is the rule, with no regular week-end shutdowns when felts can be checked carefully and re-seamed as required. Obviously, in these plants, the necessity for such overhauling must be kept at a minimum because of the serious loss of production it entails.

Incidentally, from the viewpoint of the industry as a whole, the matter of stretch in dryer felts still presents very definitely a two-sided question. Excessive stretch is, of course, bad or it wouldn't be excessive. But it is axiomatic in the textile field that the stretch or normal elasticity of any fabric is an indication of the quality, strength and life of that fabric. In other words, go too far in elimination of stretch and you affect life and utility. Even in the case of a built-up asbestos dryer felt, a pre-stretching process may involve a considerable risk because of the difficulty in controlling the result and thus maintaining uniformity and dependability.

In the very nature of things, it is obvious that there are many characteristic differences between any felt that is predominantly asbestos and another that is predominantly cotton. Yet it is surprising how much has been accomplished through research and experience in minimizing the practical effects of these differences in actual dryer felt operation.

Of course, some of these inherent differences and disadvantages persist. For instance, though it is still true that, in the case of high-production mills, asbestos felts usually require fewer changes; it is also true that, when an asbestos felt "goes" as the result of an accident, it causes considerably greater losses than a cotton felt in the same circumstances. Under certain conditions, complaints have been made that asbestos felts are more likely to spot or streak the paper because of the tendency of the asbestos to become soggy in a wet location. But there have been offsetting complaints of other kinds about cotton dryer felts under special operating conditions.

Certainly, not a little of the strong feeling for or against one or the other of the two types of felts is the result of unfortunate experiences going back several years and of the fact that the complainants are simply unaware of the many improvements represented in present-day dryer felt construction.

In any event, it's my story and I'll stick to it—that dryer felt performance, in any of its phases, is a "tough" subject to generalize on, and sometimes almost as "tough" to be specific about. However, since it can't be held against *me*, I will quote in conclusion an opinion expressed recently by a recognized authority in the paper mill field who, at one time, studied this whole subject very carefully, and who is still closely enough in touch with detailed conditions in the industry to offer important testimony.

After stating that, at the time of his original survey, the two types of dryer felt were substantially on a par, that is, the relative economy expressed as cost of dryer felt per ton of paper was substantially the same this gentleman concluded:

"In more recent years, there may have been a wider difference, but since all the mills have records of their dryer felt cost and since cotton felts are still the standard type, it can be concluded that asbestos has shown no outstanding advantage."

Maybe he's right—but gosh! how I'd hate to have to prove it!

Highlights on Crossett

Front view of plant from lime recovery end

A new day dawns and like a moving hand
Is sweeping out across the land and sea
To show the way to better things of life
Through the great strides of modern Industry.

—B. C. CHAPPLE.

HARRY E. WESTON

OVER forty years ago three Iowa lumbermen, E. S. Crossett, Dr. J. W. Watzek, and C. W. Gates started lumbering in the famous Arkansas Soft Pine timber belt in the South. Their first operation was located at Fordyce, Arkansas, and their second and third operations, both of which started a few years after the Fordyce operation, were located at Crossett, Arkansas and Lockhart, Alabama. These three companies, the Fordyce Lumber Company, The Crossett Lumber Company, and the Jackson Lumber Company, formed the nucleus of the Crossett - Watzek - Gates Industries. From the South, these companies expanded in other areas, notably in the Pacific Northwest, where one of the major units of the Crossett-Watzek-Gates Industries is located. This is the Crossett Western Company of Wauna, Oregon. All these companies for a long number of years have been operating with the underlying theory that their timber supply was a crop and not a mine. It is because of this policy that the Crossett-Watzek-Gates Companies have never cut out, and all of them are not only still operating after relatively long lives, but there is evidence in the case of some of them that they will be able to operate at their present locations for generations to come.

This is particularly true of the Crossett Lumber Company, of Crossett, Arkansas, with which this article deals. Even as far back as 1910 this company started to lay plans and feel its way into the handling of its forests along scientific forestry lines. The story of this development reads like a good novel. It cannot be gone into detail here other than to say that present day highly technical methods of handling the Crossett forests have been brought about through the slow but sure process of evolution, and with the result that the Crossett Lumber Company probably is the outstanding commercial example today in the United States of a sustained yield operation.

During the above period of evolution, additional manufacturing facilities have been added to the Crossett operations. These facilities were not added to increase the cut of virgin timber, but for the purpose of further refinement of the lumber produced and the manufacture of products other than lumber, such as acetic acid, various wood oils, charcoal, and methanol, to name a few. Such added facilities as an oak flooring plant where Crossett's famous ROYAL OAK Flooring is manufactured, a box plant, a pre-fabrication department, WOLMANIZED pressure treatment plant, the Crossett Chemical Company and the recently completed Crossett Paper Mills have made it possible to place the whole operation on a sustained yield basis and at the same time increase the total dollar sale value of the combined products of Crossett Lumber Company and its affiliated companies.

The result of this method of operating a forest property can be seen probably more readily by visiting the town of Crossett itself and becoming acquainted not only with its people but the people of the surrounding territory than in any

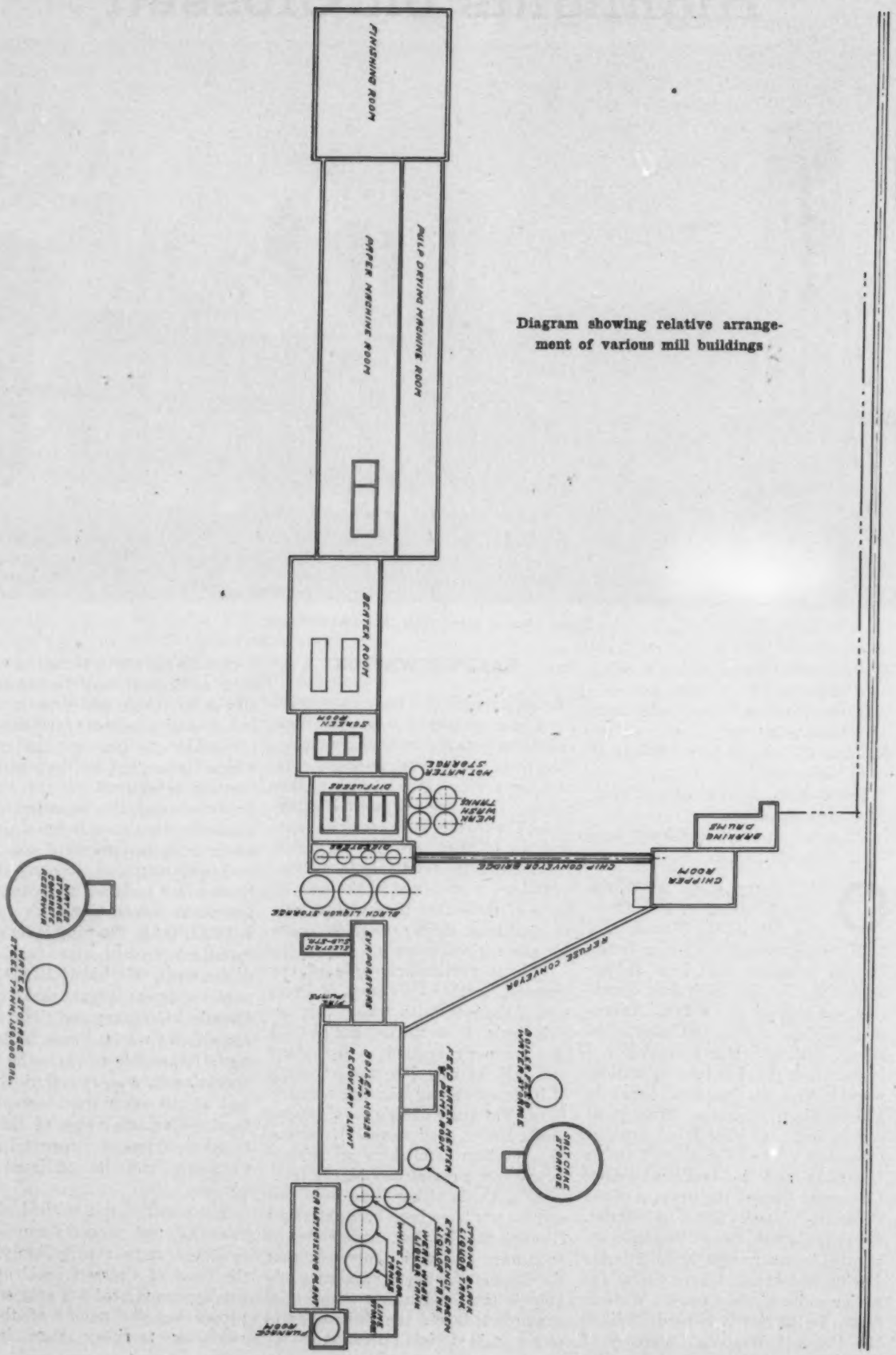


Diagram showing relative arrangement of various mill buildings

Office to the left, laboratory to the right

other way. Here is a community of 5,000 contented people. They live in comfortable homes, each with sufficient area around it not only to have a nice yard but also a garden. The schools, both colored and white, are excellent; there are several churches all well attended, a golf club, as well as other recreational facilities. There is a feeling and knowledge of security with regard to the future in the minds of these people because they realize Crossett Lumber Company is a permanent institution and that there will be growing opportunities for better jobs not only for the fathers of the families but also for their sons and grandsons who may wish to make Crossett their permanent home.

The latest development in the manufacturing end of the Crossett enterprises is the completion of a 200-ton sulphate pulp mill and paper plant, the Crossett Paper Mills. It started operating in the middle of March this year, exactly one year to the day from the time ground was broken for its construction. It is located in the manufacturing district of Crossett, which district is devoted entirely to manufacturing and it being far enough away from the center of Crossett not to interfere in any way with the pleasant home life of the inhabitants.

The buildings of the pulp and paper mill proper are for the most part of brick and steel construction but it is interesting to note that wood has been used in many places in the construction. All of the window sash as well as the doors are wood, very trim and neat in their coats of white paint. One finds timbered mill construction in the finishing room, as well as oak floors in that division of the plant both upstairs and down. Impregnated wood purlins and impregnated wood ceilings—pressure treated with WOLMAN SALTS—are found throughout the construction.

The positioning of the various buildings in relation to one another is particularly interesting. There is a grouping of the barking drum building and the chipper room; of the causticizing plant, furnace room and lime storage; of the boiler house and recovery plant and evaporator building; and of the digester building, diffuser building, screen room, beater room, machine room (paper and pulp drying) and the finishing room. This positioning is shown in the accompanying sketch.

Wood Handling and Preparation

The wood yard is laid out to permit delivery of wood by rail or highway. Space given to the yard is relatively small as it is planned to minimize the quantity of wood in storage. A supply for only a few weeks of mill operation is all that is desired.

A horizontal wood handling conveyor equipped with Jeffrey chain extends for several hundred feet along the yard track. The location of this conveyor is such that wood from cars or trucks can be unloaded directly upon it or the wood might be taken from storage.

This conveyor delivers the wood to a relatively short inclined conveyor, also Jeffrey chain equipped, that is located at its head end at a

The wood yard conveyor

4—Rear view of mill with finishing room in foreground. 5—Barking drum installation. 6—Chipper showing drive and conveyor arrangement for feeding. 7—Installation of chip screens

right angle to it. The inclined conveyor elevates the wood and discharges it into a D. J. Murray, Branch-type barking drum.

The barking drum is a two-section unit that is built of 12-in. channels, two end rings and a middle ring. All but three of the channels in each section have the grooved side facing outward. The channels which face inward are placed equidistant from one another.

The wood discharged from the drum is conveyed horizontally by means of an apron type conveyor, toward a right hand D. J. Murray chipper. While enroute, the wood is inspected, the clean barked wood going either to the chipper or to storage, the insufficiently barked wood being removed from the conveyor to an inclined chain conveyor with spurs that returns it to the feed end of the barking drum for another passage through it. The bark and other refuse of the barking operation is conveyed by means of a transfer drag-type conveyor to a main refuse conveyor that extends from the lower part of the wood room to the boiler house and recovery plant.

A belt conveyor delivers the chips produced by the chipper to two Orville Simpson Rotex screens. These screens, designated as No. 522 Special, separate the suitably sized chips from the oversize material and the sawdust. The oversize rejects are conveyed to a D. J. Murray dual drive roller type crusher in which they are broken up and then returned to the chip screens for further screening. The sawdust joins the bark from the barking drum and the other wood refuse that is conveyed to the boiler house and recovery plant.

Another item of equipment in the wood room building is a Bridgeport Safety Emery Wheel Company, Inc. knife grinder for the grinding of chipper knives. Provision also is made in the case of the barking drum building for the installation of a second barking drum, should the quantity of wood being handled require it.

A chip conveyor bridge connects the wood room and the chip loft. The conveyor which it supports and houses extends from the wood room to the far wall of the digester house. This conveyor, utilizing Jeffrey trough idlers, is equipped with a New York Rubber Company rubber belt.

As the accepted chips from the chip screens reach the chip loft upon this conveyor, they are discharged by means of a Jeffrey tripper into the bin.

The side walls of this bin are formed by the walls of the digester building. Two layers of wood supported by a structural steel framework make the bottom. The outside layer, arranged horizontally, around

the bottom, is of softwood. The inside layer, that in contact with the chips, is of hardwood, the wood being laid in the direction of the flow of chips.

Digestion and Pulp Washing

The digester installation, located directly below the chip bin, consists of four Babcock & Wilcox electrically welded digesters. To each digester is connected a Foster-Wheeler indirect heating system.

Upon completion of a cook, the charge is blown from the digester through an electrically-operated Yarnall-Waring blow valve, operation of which is controlled from the working floor, into one of two sets of six each of Babcock & Wilcox diffusers. These diffusers are arranged in a rectangular layout, four rows of three each, over two separate stock chests, one for each set of six diffusers, rather than placing them in a circle around a dump chest as is done in a conventional layout. The arrangement is very neat and compact.

The diffuser room is provided with four large storage tanks. One of them is for strong black liquor wash; while the other three are for weak black liquor, hot water and cold water respectively.

A C. H. Wheeler surface type condenser is used to condense the blow steam and relief gases from the digesters and to furnish hot water for pulp washing. This condenser is designed to permit easy cleaning and the removal of any pulp which might be carried over with a blow.

Three storage tanks, of steel construction, are provided to retain the filtered black liquor until desired for concentration. These tanks are located in the area between the digester building and the evaporator building in a line parallel and close to the adjacent digester building wall.

Concentration of this liquor is accomplished in a Swenson five-body quadruple effect evaporator.

Liquor passes through the evaporator in the reverse direction to the flow of chips.

Liquor Concentration and Chemical Recovery

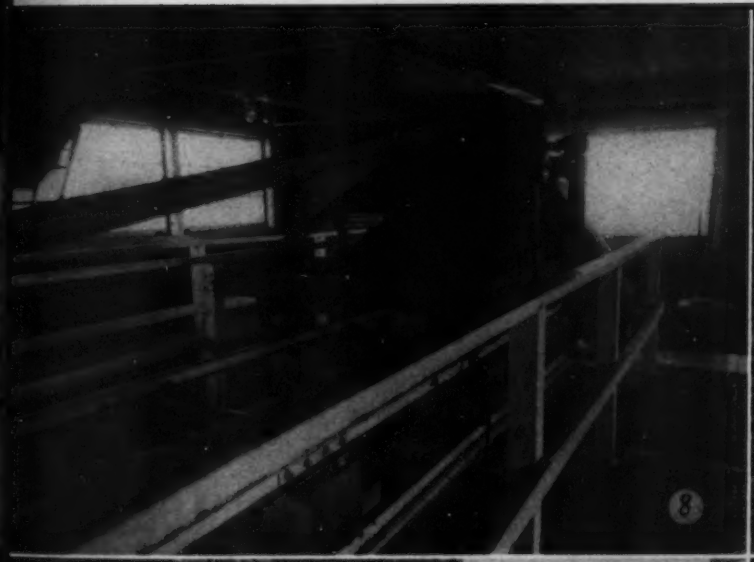
The concentrated black liquor from the evaporator, pumped to a storage tank in the recovery room, flows by gravity to two salt cake mixing tanks.

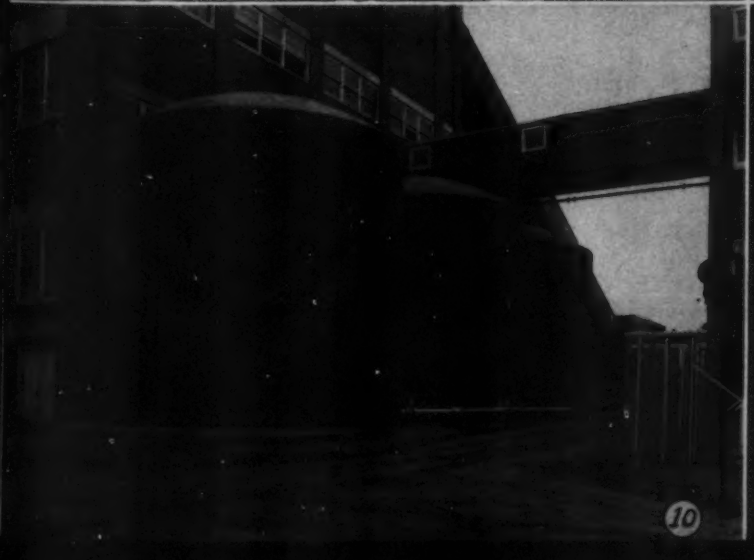
Salt cake, received at the mill in powdered form, is delivered pneumatically by means of a Holly system to storage and from storage to process hoppers that feed the mixing tanks or the salt cake is delivered to the process hoppers direct.

The mixture of salt cake and black liquor is pumped through spray nozzles to three B & W-Tomlinson units.

Operation of the three B & W-

8—Tripper arrangement in chip loft. 9—Operating floor of digester building. 10—Insulated steel tanks for black liquor storage. 11—The evaporator installation





Tomlinson units is controlled and recorded through the use of Bailey control and metering equipment.

Installed along with the three B & W-Tomlinson units are two Stirling boiler units. One unit, to be fired with natural gas only, is equipped with three B. & W. forced draft natural gas burners. Three similar burners are installed in the second unit, and it also is equipped for burning bark.

Smelt from each of the three B & W-Tomlinson units flows over a specially constructed spout to a dissolving tank, where it is mixed with weak liquor from the causticizing operations to form green liquor. This liquor, when of proper strength, is pumped by means of three Bingham pumps to the causticizing department, where it is received in a green liquor surge tank.

From the surge tank the turbid green liquor flows continuously into a rectangular Infilco settler. Green liquor dregs from this settler are washed and returned to another settler. The clear green liquor then flows and is metered to a slaker classifier of special design, where a weighed quantity of lime is added and the liquid overflows to three agitator reaction tanks. At this point the reaction is complete and the caustic liquor is then pumped to another Infilco settler, the sludge from which is washed and returned to a weak caustic settler.

The overflow from the strong settler goes to cooking storage while the overflow from the weak caustic settler, and also green liquor dregs settler, is sent to a weak liquor storage from whence it flows by gravity to the dissolving tanks to be made up to the required strength.

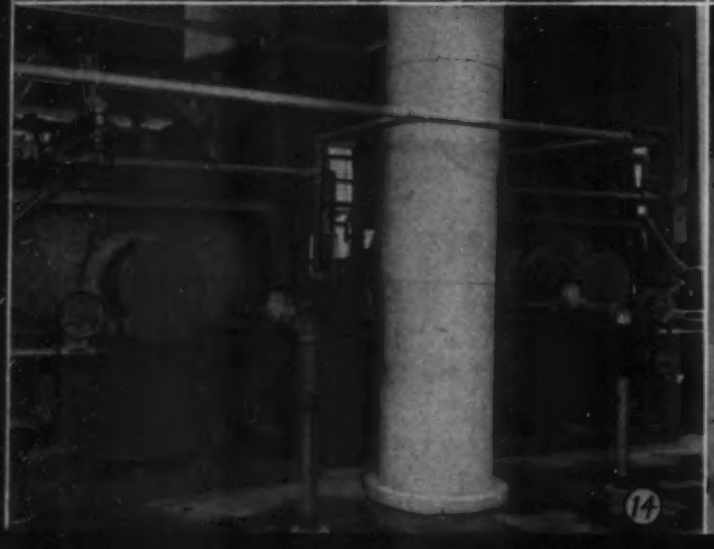
The four Infilco settlers are constructed in one rectangular formation. The sludge that is taken from the weak liquor settler is then sent to one of two Filtration Engineers, Inc., vacuum filters. The filtrate from the filter returns to the weak green liquor storage and the sludge falls into a vertical Nichols-Herreshoff lime burner which is equipped with eight hearths, the sludge traveling countercurrent with the heat.

The Nichols-Herreshoff burner is equipped with multiple gas burners, placed in each hearth, and is fired by natural gas. The central shaft carrying agitators is air-cooled. As the reburnt lime leaves the furnace it is conveyed by a Jeffrey bucket elevator, which discharges into the lime bin from which the slaker, before mentioned, is charged with the proper quantity of reburnt lime for causticizing the green liquor.

Pulp Treatment After Washing

Major equipment for pulp screening and thickening includes Impco knotters, fine screens, washer thickeners, tailing screens, a Dilts Hydra-

12—Causticizing plant looking toward settling equipment. 13—Equipment for pneumatic handling of salt cake. 14—Lime mud filters. 15—Section of lime recovery furnace showing gas burners and observation doors



16—Knotters, screens and pulp thickening equipment. 17—One of the two Vortex beaters. 18—Line of Hydrafiners. 19—Size making equipment.

finer, a Rogers wet machine, and a pulp drying machine.

Pulp from the diffuser chests is pumped to the Impco knotters located on the main floor of the screen room as are the fine screens, tailing screens, and the washer thickeners. Gravity flow carries the accepted stock from the knotters to and through the fine screens, each of which is equipped with stainless steel plates, and to and over the washer thickeners which discharge it to two separate stock chests. The fine screen rejects are thinned and pumped back to the tailing screens for rescreening, the accepted stock from which passes over the washer thickeners. Rejects from the tailing screens and from the knotters, after thickening somewhat, are passed through a Dilts Hydrafiner and the screenings pulp thus produced made into sheets on the Rogers wet machine for subsequent use in the production of certain grades of liner board and paper.

The pulp drying machine, located in the basement of the machine room, has been installed for the drying of pulp that is produced in excess of paper machine requirements. Such pulp can be stored for future use or sold and shipped.

The machine is of three cylinder design. Each of its vats is equipped with an individual white water pump. There are five pairs of primary rolls, three pairs of main presses, a duplex cutter and a baling press.

This machine has a rated capacity of 60-75 tons of pulp per 24 hours.

Installed in the beater room, located directly between the screen room and the paper machine room, are six Dilts Hydrafiners, two Appleton Vortex beaters, and six Shartle Miami jordans, the Hydrafiners and jordans being located in two separate but parallel lines.

Both the Hydrafiners and jordans are direct-connected to individual motors.

The Appleton Vortex beaters are located conveniently to the Hydrafiners and jordans.

The size is produced in a Delthirna unit. This unit is installed in the beater room basement as is the Rogers wet machine that was mentioned previously.

Alum delivered to the mill in tank cars as a 50 per cent solution is stored in lead-lined wood tanks. Two Duriron pumps deliver the alum from these tanks to measuring tanks from which it is drawn to precipitate the rosin size as used in the sizing operation.

Paper Machine and Auxiliaries

The paper machine, a Bagley & Sewall Fourdrinier, has been built for speeds from 200 to 1500 ft. per minute.

The fourdrinier part is arranged

20—Paper machine wet end. 21—Press section of paper machine. 22—Dry end of paper machine. 23—Paper machine hood from the top

to operate with a wire 210 in. wide and 90 ft. long and to permit a wire change without the usual removal of operating parts. A special rear cantilever construction makes possible such a wire change.

Pitch of the wire may be varied without disturbing the slice.

The slice is of adjustable design. It has a chromium plated tip. Behind it is a flow evener roll.

The breast roll is 26 inches in diameter; table rolls 10½ inches; wire rolls 15 inches; and the couch roll 36 inches. The couch roll is a Beloit suction roll.

There are seven suction boxes. The boxes are of manganese steel. Covers are hard maple.

Flat box regulation is obtained with a Broughton unit vacuum control system, each box being equipped with a Broughton controller and a barometric leg that extends to a seal box on the basement floor below.

Two suction presses and a smoothing press constitute the press part of the machine. The presses are arranged to operate with two lower felts. The smoothing press is feltless.

The top press rolls are equipped with Vickery doctors. A Sheehan automatic paper carrier receives the sheet at the second press and delivers it to a second Sheehan carrier that serves the entire dryer section.

The dryer section consists of fifty 60-inch dryers and four felt dryers. Dryer gearing is of the totally enclosed small diameter type. Gears are mounted on special ground dryer journals. Gear guards are built integrally with the dryer frames. The result is a dryer section with a back side nearly as accessible as the front and with the mechanical hazard of operation reduced to a minimum.

Felt rolls for the dryers, like the felt rolls of the press section, are rubber covered. Ten of the wet end dryers, also, like the top press rolls, are equipped with Vickery doctors.

Table rolls, top and bottom suction press rolls, top and bottom smoothing press rolls, felt rolls and dryers are mounted in SKF bearings. The dryer bearings are specially designed. The design incorporates means for taking care of expansion or contraction without causing excessive thrusts.

A Midwest - Fulton system equipped with a Nash special dryer exhaust unit handles steam flow and condensate removal for the dryer section. In such an installation, the strainer connection on the separating tank of the Nash unit is piped to the condensing dryers of the Midwest-Fulton system, while the hot condensate pumps draw from the Midwest-Fulton flash tank. Discharge connections from the two pumps run into a common header which leads to a hot well and from which the condensate is returned to boiler feed.

Over the dryer section is a Ross

fireproof, panel-type hood, the panels of which are formed by bolting Transite asbestos board to angle iron frames with countersunk brass machined bolts. This hood, with wide overhang and deep curtains, is carried on the machine frame by means of stanchions which support an I-beam cradle that completely surrounds the dryer section.

Vapor is drawn off of the hood through four dormer connections and four exhaust fans. These fans, discharging to the atmosphere, are located on a mezzanine platform over the drive on the back side of the machine.

This same mezzanine holds two supply fans—one supplying air to the roof over the paper machine room, and the other to the bottom dryer felt on the paper machine. In the former case, the air is distributed to the roof by an elaborate system of duct work. In the latter case, it is distributed over the felt by means of cross nozzles.

Farrel-Birmingham rolls are used for the calender stack. The stack is equipped with an electric lifting arrangement and rolls are fitted with Vickery doctors.

The reel is of the automatic uniform speed type in which the sheet is automatically transferred by lowering an empty reel shaft, always in the most desirable position nearest the calender stack, into contact with the reel drum. Both the reel drum and the reel shafts are mounted in anti-friction bearings, the unwinding stands being designed to receive the shafts with the bearings. Westinghouse generating braking device provides means for suitable tension control for the unwinding stands.

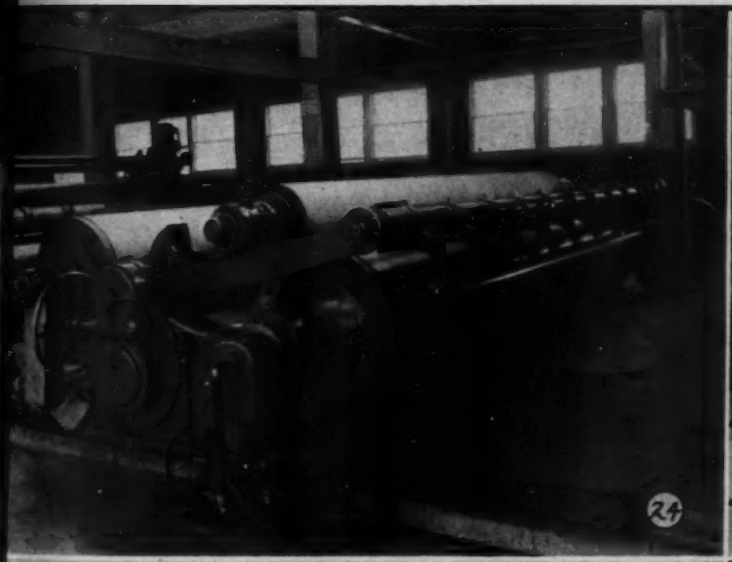
The winder is of the two-drum type and is designed for normal running speeds of between 2500 and 3000 ft. per minute. All rolls are carried on anti-friction bearings, including a 10-inch diameter rider roll. A paper roll handling device is built integrally with the winder. This device permits removal of the finished roll of paper from the winder without resorting to the use of an overhead hoist.

The machine is driven by a Westinghouse sectional electric drive which receives its power from a turbine driven generator. Each section of the machine is driven by a direct current motor through a reduction gear unit.

The motors are type I and SK machines totally enclosed and arranged for forced ventilation. The reduction gear units are totally enclosed, self-lubricated units with helical type gearing and anti-friction bearings.

The motors are separately excited and are maintained at correct relative speed by means of Westinghouse carbon pile type differential speed regulators. Each section speed regulator is provided with synchrotie type draw adjusting mechanisms which permit adjustment of the

24—High speed reel. 25—Drive side of paper machine from dry end. 26—Storage for mill water supply. 27—Main electrical switchboard



One of the eight deep well pumps

draw from the front side of the machine.

A starting generator, coupled to the main generator, serves to start and accelerate the various section motors and to operate the individual sections at low operating speeds as required for washing up or making machine adjustment.

Lubrication requirements for drive gears and all automatically lubricated bearings on the paper machine, such as dryer and calender roll bearings, are met with a Bowser oil purifying and circulating system. Two similar systems are used for the beaters, jordans and Hydrafiners.

The lubricating system attached to the paper machine has its storage and oil filtering equipment located in the basement directly below the machine. Similar equipment for the other two systems is located conveniently in the basement beneath the equipment which they serve.

Two other major items of equipment installed in the machine room are an Oliver save-all and a Whiting crane. The Oliver save-all is located directly behind the fourdrinier part of the paper machine and receives the white water from it. The Whiting crane extends the full length of the machine room above the paper machine.

Other equipment in the machine room basement includes a Dilts iron tub broke beater, a Lobdell roll grinder, an Ingersoll-Rand air compressor, six Nash vacuum pumps, and necessary water and stock pumps.

Finishing Department

Two large rooms, each 128 ft. square, are given over to the finishing department. One of them is on the machine room level. The other is at the same level as the loading platform—a four car platform with an elevation a little above the machine basement.

An Otis elevator connects the two floors of the finishing department. Double button control makes it possible for the elevator to be operated in either direction from the car or from the hatch landings, providing the hatchway gates are closed properly.

The equipment of the finishing room includes two Cameron rewinders, one Hamblet sheet cutter, one Seybold sheet cutter, and Fairbanks Morse floor and platform scales.

Electrical Equipment

Practically all of the electrical equipment for the mill, in addition to the sectional electric drive for the paper machine, was furnished by Westinghouse. This equipment included three 833 kva. transformers, three 150 kva. lighting transformers, incoming lines and distribution switch-gear and motors. The motors range in capacity from fractional horse-powers to 350 hp., and in construction from open type to totally enclosed forced ventilated, splash and drip-proof, and totally enclosed dual ventilated. The types include I, SK, CS, CW and synchronous.

Power and Process Piping

Two systems of steam piping are used. One system operates on 150-lb. gauge; the other on 30-lb. The digesters and the paper machine turbine are supplied by the 150-lb. system. At the same time, through reducing stations, it supplies the evaporator as well as furnishes emergency steam for drying. Regular steam for paper and pulp drying is obtained from the paper machine turbine which exhausts at 30-lb. The 30-lb. steam system in the evaporator room is cross connected with the paper machine turbine exhaust so that steam can flow in either direction.

The steam to the evaporator is supplied with a regulating valve so that pressure can be varied from 20 lb. to 30 lb. per sq. in. A regulating valve also is used in connection with the steam supply line to the digesters. Desired flexibility in the piping connected to the digesters and heat exchangers was obtained by the use of corrugated tangents.

Both power and process steam piping systems were welded throughout as far as practicable. All valves and header outlets were flanged.

Stock piping was built up by using tees and crosses frequently. Liquor lines were provided with frequent joints.

Some of the steam piping was designed for an increase in steam pressure to approximately 425 lb. per sq. in. to provide for the possible installation at a later date of extraction turbines for power and drying. All piping was designed to conform to the American Standards for the several pressures in use. Flanges of the Van Stone type were used for all piping systems that ultimately may carry 150 lb. per sq. in. and over; and pipe bends were used wherever possible to compensate for expansion and to reduce friction. All reductions in the run of steam piping of 150 lb. per sq. in. pressure or over were made by swedging the ends of the pipe to provide easy flow of the steam and to reduce the number of welds.

All underground water piping systems for fire protection and mill service were constructed with bell and spigot cast iron pipe with bell and spigot valves and fittings.

Fresh Water Supply

Some reference has been made to a few of the pump installations. Many of the applications, however, which have not been mentioned, are equipped with Warren & Bingham pumps. These applications include pumps ranging in capacity from 100 g.p.m. to 6,000 g.p.m.

Eight deep wells, each equipped with a Layne vertical turbine pump, supply fresh water for the mill. The wells ranging in depth from 125 ft. to 195 ft., are located in a catchment area of approximately 800,000 acres.

The pumps are electrically driven by direct-connected motors and the control is of the automotive type.

A welded steel water line connects the wells with the mill. This line discharges into an enclosed steel tank which, in turn, overflows into an open concrete tank. It is from this storage that fresh water is distributed throughout the mill. The fire pump for the mill also is connected to it.

Potpourri

An attractive office of wood frame construction and a chemical laboratory of similar construction have been located near the main entrance to the plant. The office is air-conditioned.

Many other miscellaneous facts regarding the mill might be given but the following are probably most pertinent.

A total of 3,680 piles with a lineal length of 75,000 ft. were driven on the site of the mill to support buildings and equipment.

Crane valves are used most widely throughout the mill but both Powell and Record valves also are in evidence.

All stock chests are rectangular in design, of concrete construction, unlined, and equipped with Medart horizontal agitators.

The pulp machine is fitted with a hood of the same construction as that over the paper machine. Vapor is taken from the hood by means of vertical stacks from the center of the hood to fan equipped ventilators mounted on the roof above the pulp machine. Supply air to this machine room goes to the roof, where it is distributed in the same manner as the supply air of the paper machine.

The beater room and screen room are heated by means of high velocity type unit heaters which take the air from the outside. This outside air eventually finds its way to the machine room to supplement the air supplied, directly to it.

The finishing department is heated by means of low velocity unit heaters which completely recirculate the air in the department.

Two Otis elevators, other than the one already mentioned, are installed in the mill. One unit serves two floors, while the other serves four.

A steel tank, supported on a structural steel framework to give it a height of 125 ft., is located in the mill yard for fire protection purposes. This tank was furnished and erected by the Chicago Bridge and Iron Company as were all of the other major storage tanks of steel construction.

Hardy S. Ferguson was the consulting engineer on this project. He was responsible for complete design, layout, building specifications, and supervision of construction. The resident engineer for Mr. Ferguson was R. G. Seip.

The Rust Engineering Company was responsible for all construction work. Its contract involved the turning over of a complete mill ready to run to the Crossett interests. The superintendent of construction for Rust Engineering Company was J. M. Kelley.

The mill is known as Crossett Paper Mills, Division of Crossett Lumber Company. K. A. Forrest is general manager and Bruce Suttle is general superintendent.

THE CROSSETT PAPER MILLS

Have Installed

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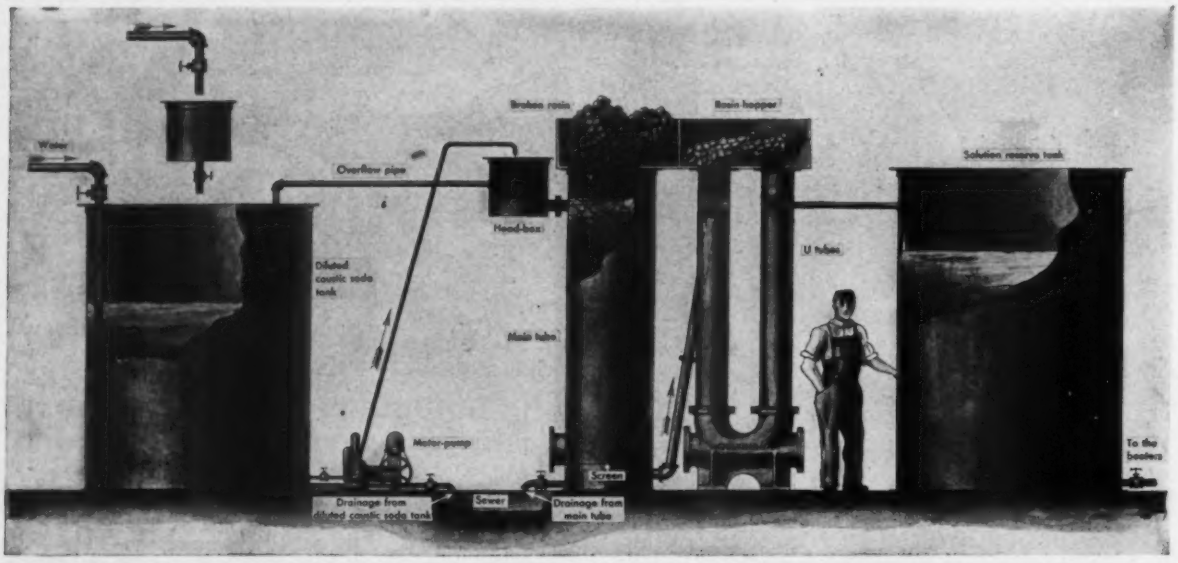

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Paper Sketches ---

Dr. JACOB CHRISTIAN SCHÄFFER

AS EARLY AS 1771, THIS GERMAN NATURALIST SUCCESSFULLY HAD PRODUCED SPECIMEN SHEETS OF PAPER FROM MATERIALS AS VARIED AS WASP'S NESTS, MOSS, VINES, BARK, STRAW, HEMP, CABBAGE STALKS, THISTLES, SEED, INDIAN CORN HUSKS, TURF, PINE CONES, OLD SHINGLES, POTATOES, BEANS, REEDS, MALLOW, ASBESTOS, LINDEN LEAVES, AND FROM YELLOW AND BRAZIL WOOD.

SOUND STUDIOS AND MICROPHONES HAVE PROMPTED THE DEVELOPMENT OF A PAPER IN WHICH RATTLE HAS BEEN REMARKABLY REDUCED.

PAPER USED IN BOOKS PRINTED IN CHINA DURING THE SUNG DYNASTY (960-1180 A.D.) HAS COME DOWN TO OUR ERA IN A PERFECT STATE OF PRESERVATION.

IN MEDIEVAL DAYS, THE FLORENTINE (ITALY) GUILDS OF PAPERMAKERS AND STATTONERS WERE SUBORDINATE BRANCHES OF THE GUILD OF APOTHECARIES AND DOCTORS.

Training Skilled Workers

J. NORMAN SPAWN*

IS INDUSTRY paying as much attention to developing well qualified workers as it is to utilizing the most up-to-date equipment?

Do you believe that there will be a sufficient supply of skilled employees in 1938, 1939, or 1940?

If business improved 10 or 15 per cent, would there be a sufficient number of thoroughly competent skilled workers to man the jobs?

These questions are more or less pertinent now with business improving at a rapid rate.

Paper Mills Expanding

From the *Paper World* of March, 1937, an article headed "?00,000,000 Paper Dollars Go South," states that a dozen or more large paper manufacturing concerns are now building or will start soon to construct new paper mills in the South. Also there are a number of building expansion programs being made by Northern mills, all of which means a greater demand for skilled workers.

Skilled Worker Shortage

When it is considered that during the last seven years with production at a minimum in a number of the mills, comparatively few new workers have been trained. Skilled help was abundant, and as employers thought it necessary to reduce costs, many training programs inaugurated during prosperous times were largely abandoned. Such training as has been continued has according to some authorities consisted largely of unorganized exposure to a number of jobs and operations. This cannot be compared to the organized program so necessary to develop the learner into a skilled craftsman. Therefore, the breaking down of training programs is one reason for a shortage of skilled workers.

There is a loss of skilled workers to industry each year due to death and retirement amounting to about 5 per cent. Replacements for these losses have not been made in many cases during the depression years, which is another possible cause of skilled labor shortage. A number of workers have deserted their trades to take up other types of work due to lay-offs they have had during the depression period. Having made the break from their former lines of employment and now apparently secure in their jobs, they hesitate to return to the uncertainty of their old jobs, another possible cause of skilled labor shortage.

The restriction of immigration has reduced the number of skilled workers coming to this country. There are certain industries which have depended on immigration for a large part of their trained workers in the past. The curtailment of this source of supply is another contributing cause of skilled labor shortage.

From a number of sources, it is found that with increasing business activity, employers in many lines are reporting a scarcity of well qualified skilled workers to man the jobs. This scarcity threatens to become acute with further expansion of the paper business in prospect.

Organized Training Programs

One solution for the shortage of skilled workers lies in an adequate employees training program within the industry. Such a program should be organized to cover all phases of jobs for each group of workers in the respective organization such as:

1—Apprentice training for young help.

2—Job training for new workers above the apprenticeship level.

3—Advanced and specialized job training for skilled workers.

4—Supplementary training for technical men.

5—Specialized training for the supervisory force.

By taking advantage of the opportunities offered for co-operation with the service and training programs of other lines of industry as well as with the local and state vocational agencies, a well organized plant training program can be conducted for a comparatively economical budget.

Apprentice Training

President Roosevelt recognized the shortage of skilled workers some time ago for on June 27, 1934, he issued Executive Order No. 6750-C setting forth rules and regulations for the employment of apprentices. This order provided for the establishment by the Secretary of Labor of minimum standards of apprenticeship, also the appointment of a Federal Committee on Apprentice Training.

The two responsibilities given to this committee were:

1—"Helping the States to inaugurate or continue programs in accordance with basic standards for apprentice training."

2—"Assisting in the establishment of committees in each State authorized to organize and co-ordinate apprentice training in all its phases."

The program as contemplated, provides for a federal committee on apprentice training and for committees on apprentice training in each State. These State committees receive assistance from State trade advisory committees and from local trade advisory committees whose personnel consists of representatives from the occupation in which apprentices are to be trained. The federal committee assists the States in planning programs which include a few fundamental standards which it is desirable to have uniform in all States.

The federal committee on apprentice training and its affiliated State committees have adopted standards, perfected organization and outlined administrative procedures for training apprentices in a number of different trades in the various States.

Vocational Education

The Vocational Division of the Bureau of Education, U. S. Department of the Interior has done some exceedingly effective work for a number of years cooperating with the State Department of Vocational Education in promoting trade extension work and foremanship training courses in many industries. These courses have done much toward stimulating the interest of executives and workers in developing greater skill in craftsmanship or the handling of the managerial and supervisory responsibilities by the foreman. A number of industries have taken advantage of their services to develop their workers along their respective organization line of work.

In-Service Training Programs

An effective In-Service Training Program has so many angles of service to render their employees which are difficult for the average worker to secure outside of his own particular line of work. There are cases where over 50 per cent of the employees in a plant have taken advantage of the training programs put on by their company, over a number of years.

In some industrial plants the need for thoroughly trained employees capable of successfully carrying out all responsibilities the executive delegates to them is a serious problem.

As already stated, some plants have established their own "In-Service Training Program" to develop personnel and handle various problems which may arise within the organization. These programs can prove very profitable, in fact, a training program is not warranted unless it can produce a profit.

These profits can be measured in a number of ways such as:

1—A decided improvement in skill.

2—Greater ability to carry responsibility successfully.

3—Increasing production.

4—Lowering production costs.

5—Improving quality.

6—Increases workers earning capacity which helps to promote contentment.

7—Cutting down overhead.

8—Assists materially in developing a safety conscious worker, thereby eliminating many accidents.

9—Promoting the goodwill of the employees.

10—Developing organization and plant loyalty.

11—Improving the living conditions of the workers families.

12—Provides greater opportunities for the workers families.

All of which assist considerably in promoting a growing prosperous concern.

*Formerly Educational Director, Champion Fibre Company.

There are many problems or tasks in an industry that can be turned over to the Training Department for solution, just as the safety, health, personnel, production and traffic problems are given to those respective departments for solution.

Trained Workers vs. Untrained Workers

The competition in the various types of industry and the degree of proficiency required puts considerable emphasis upon the training the worker has had. The business executives are placing more thought on the selection of the right man for each position of importance in their organizations.

Many executives consider their success has been upon their ability to select qualified men for the jobs. This is true for the success of any plant is dependent upon the success of the workers.

The business executive may be a man of great ability; he may be a genius at organization, finance, etc.; but without trained men to do the work in his plant and to carry out his orders, he would be practically helpless.

The modern company realizing the importance of having trained men on the jobs conducts its own training departments within the company plant. A company having its own training department gives every man within the organization an opportunity to secure the necessary training to competently perform his work. The men appreciate this opportunity.

Crown-Willamette Training Program

The exceedingly interesting training program of the Crown-Willamette Company as described in THE PAPER INDUSTRY for February, 1937, by W. R. Barber entitled Crown-Willamette Paper School tells how that company has handled the training of its production.

The full value of such training work conducted by the company increases year by year in the same proportion as the employees knowledge and training is increased. It has been proven that wide-awake men are never too old to learn.

The more continuous a plant educational and training program is, the greater will be the growth of that plant. "A company grows as its men grow."

Training applies in business or industry, the same as with athletics. A team of stars or experts, does not make it a winning team, as may be witnessed each spring in predictions by the newspapers regarding the various baseball teams in both leagues. Although these players are playing almost daily yet every morning possible, all members of the teams are out for training practice. Likewise with the workers, although they may be working steadily, they need training to produce a growing company for "A company grows as it workers grow."

◆ Paul A. Trost

The passing of Paul A. Trost on April 13 saddened many friends and acquaintances of the widely-known paper-mill engineer who had been a member of the George F. Hardy organization for about thirty-five years.

Well-known throughout the paper industry because of his connection with a number of large mill developments, Mr. Trost received his education at New York University and was a long-time member of the American Society of Civil Engineers, American Society of Mechanical Engineers, Institute of Civil Engineers of Canada and a professional engineer of the State of New York.

◆ George F. Steele

A pioneer in the American paper industry, George F. Steele passed away April 1 at his home in New York City at the age of 78. He is survived by his wife, five daughters and a son.

A native of Watertown, Mass., he was graduated from Lawrence University, Appleton, Wis., in 1878 and in 1879 became a bookkeeper in the Van Northwick Paper Mills of Appleton. Later he became general manager of the firm and was known as the builder of the second sulphite mill in the United States.

Practically all of his business life was devoted to paper and at the time of his death he was chairman of the board of the G. F. Steele Company, dealers in newsprint as representatives of paper mills. The only interval in his long service in the paper industry were the years he spent as a partner in the old Deering Company which was later taken over by the International Harvester Company.

After his return to the paper industry in 1906 Mr. Steele was made an executive in the Port Edwards Fibre Company, Port Edwards, Wis., and after a short service as vice-president he became manager of the News Print Manufacturers Association. He left association work in 1907 to become manager of the Canadian Export Paper Company and in 1922 he formed the News Print Paper Corporation in New York. After about five years Mr. Steele formed the company which is in his own name and has operated as one of the most important United States agencies for the sale of Canadian newsprint in the American market.

◆ Henry G. Prosser

Henry G. Prosser, 53, vice-president and treasurer of the Bermingham and Prosser Company, passed away March 21 while at a visit to the company's branch office at Kalamazoo, Mich. Mr. Prosser was connected with the former Bermingham and Seaman Company and joined with others in 1915 to form the company which now bears his name. Funeral services for Mr. Prosser were held in Wilmette, Ill.

◆ John Lundrigan

A long and auspicious career came to an end when John Lundrigan, familiar and well-known figure in the paper industry as well as in state and governmental affairs, passed away March 13 at Hamburg, N. Y.

Born in Hornell, N. Y., January 22, 1865, Mr. Lundrigan began his business career with the Erie Railroad at the age of 18. While serving there Mr. Lundrigan became prominent in employee organization activities and in 1905 he was appointed chairman of the N. Y. State Board of Mediation and Arbitration. During the years of 1905 to 1910 he figured extensively in the news because of his success in settling labor disputes. Active efforts which aided in settlement of a serious strike by employees of the International Paper Company resulted in Mr. Lundrigan's appointment as general superintendent of the Industrial Bureau of that company. He remained in the latter capacity until his demise.

During Mr. Lundrigan's tenure of office with International the company never had another serious strike and he was able to build up a most effective system for safety which won several awards for records. In safety work as in group insurance plans Mr. Lundrigan was a pioneer. His work necessitated familiarity with all laws relating to compensation and relationship between employer and employee and so well posted was he on this subject that he was called to Washington several times in an advisory capacity.

Besides his activity entailed by labor-capital relationships Mr. Lundrigan was ever a prominent figure at the Pulp and Paper Sectional meetings of the National Safety Congress and his counsel undoubtedly aided the solution of many hazardous problems which arose regarding the question of safety in the mills of the section.

◆ Flintkote Expansion

An expansion program at the plant of the Flintkote Company, Pioneer division, 5500 S. Alameda Street, Los Angeles, is now well under way. At a cost of approximately $1,000,000, five new or reconstructed buildings will give the company an additional 113,645 square feet of floor space for the manufacture and storage of chip board, boxboard, patent coated board, manila liner board and building papers.

New buildings under construction are a paper mill, a corrugated container plant and a stock preparation room. The chip and boxboard warehouse and the beater room are being enlarged and thoroughly reconditioned. Steel, concrete and brick construction is being used throughout. Nearly half of the new floor space will be used for the manufacture of corrugated containers and specially designed machinery will be installed for every stage in container manufacture.

The main floor of the new paper mill will be 30 feet high, giving clearance to the stack-type vertical dryer section and other machinery, have a 9 foot basement and contain a total floor space of 26,104 square feet, while the 10,380 square feet

of the new stock preparation room will be utilized in placing breaker beaters, disintegrator pumps, jordans and pulp-refiner units. 25,400 square feet in the new chip and boxboard warehouse will be available for storage purposes while the foundations of the building are sufficiently strong to carry an additional story should future developments require it.

Building construction is expected to be completed before May and the machinery should be installed within 90 days from that date. The increased output of the plant will add about 125 new employees and $225,000 annually to the payroll and bring the total number of employees to more than 500. Similar construction is being undertaken in other plants of the Flintkote Company throughout the country at a total cost of approximately $4,000,000.

◆ Southern Spa Scene of LNA Convention

White Sulphur Springs, W. Va., will be the scene, this year, of the annual convention of the Lithographers National Association, Inc. The convention, which will last three days commencing May 11, will embody exhibits which will demonstrate the services the lithographic business is prepared to render industries related to it.

A number of speakers, including George E. Sokolsky, the well-known writer and speaker on industrial topics, will address the assemblage on phases of marketing and the problems facing industry. The series of sessions planned will cover not only the lithographing business, but will be concerned with related industries as well.

◆ Airline Features New Pulp Trays

A new light-weight and economical meal service tray, designed for use by air-line passengers, has been perfected for the United Air Lines by the Pulp Products Company of New York. These fourteen ounce, heat-retaining trays are constructed of moulded pulp, which has a very high insulating value, and will be used for serving light lunches on the intermediate schedules of United Air Lines.

◆ New Machine Sends Color By Wire

Using new tools of science, research colorists at the International Printing Ink Corporation are now able to send color samples by telegraph.

In IPI's laboratories, a recently-developed machine called the recording photoelectric spectrophotometer is used for analyzing, matching and standardizing colors. Invented at Massachusetts Institute of Technology, the "spector" has been found to be an analyzer much more precise than the human eye and can detect color variations that the eye could never see at all. Reported to be able to distinguish between more than two million colors, the "spector" charts in four minutes on a sheet of graph paper the characteristic of any hue. Every color has its own individual graph curve and by examining these curves engineers can easily determine the reflectance properties of any color or they can tell whether colors match. As no two curves are exactly alike, unless they are for the same color, an absolute match is assured when two curves coincide.

By means of Western Union's new facsimile service, opened to commercial use between New York and Chicago and New York and Buffalo, "spector" curves can now be sent by wire and thus, scientifically accurate, color specifications or color matches can be telegraphed in a few minutes to printers, designers, advertisers or anyone who needs color analysis in a hurry.

◆ Space Going Fast For Power Show

That the new power show, the Chicago Exposition of Power and Mechanical Engineering to be held October 4-9 at the new International Amphitheatre in Chicago, may be a sell-out, was indicated when it was learned that more than one-half the total floor space available has been contracted for.

In addition to its displays of raw materials and finished products, including modern metals and recent alloys, the Chicago Power Show will afford an up-to-the-minute review of heavy plant machinery and the innumerable accessory machine units which serve the largest industrial plants.

Charles F. Roth, vice-president of the International Exposition Company, will be manager of the Chicago Exposition of Power and Mechanical Engineering and all matters of contract and arrangement will be under his personal direction.

◆ THAT PLANT MODERNIZATION is now extending through the entire range of power and steam producing fields would seem to be indicated by reports from the Elgin Softener Corporation, Elgin, Ill., who reports a sales volume in 1936 sixty-one per cent ahead of 1935 and for the first quarter of 1937 forty per cent ahead of 1936.

◆ Reciprocal Trade Agreements Have Effect on Paper Industry

When reciprocal trade agreements were proposed, administration spokesmen stated that some industries would have to expect to make sacrifices in order that other branches of industry and agriculture might prosper. The 1936 statistics, compared with those of 1934, indicate that divisions of the paper industry were among the groups to make a sacrifice.

Exports of paper in 1936 were four million dollars more than in 1934, but eight million dollars lower than in 1929. Imports increased over 23 million dollars as compared with the pre-agreement year of 1934; of the increase all but $1,000,000 was in items listed in various agreements.

It will be seen from the above that the reciprocal trade agreements offer no promise to the paper industry, and that heavy losses were probably only averted because of the increased demand for domestic papers during most of last year.

A joint resolution has been passed by Congress and signed by the President providing a three-year extension of the authority given the administration to enter into reciprocal trade agreements with other nations.

◆ Nickel and Alloys Discussed

Two chapters of the American Society for Metals held meetings last month, both being addressed by F. L. LaQue, of the International Nickel Company, Inc., in the Development and Research Division. The New Jersey Chapter met in Newark, N. J., at the Newark College of Engineering, March 12; and the Northwestern High School Auditorium was the meeting place, March 15, of the Detroit Chapter, at Detroit, Mich.

Mr. LaQue's subject was "Properties and Applications of Nickel and Its Alloys." He placed special emphasis on the physical and chemical characteristics of nickel itself, and the effects it has in improving the mechanical and corrosion resisting properties of non-ferrous alloys in which it is present.

The talks were illustrated by motion pictures showing the methods of mining, smelting, and refining of nickel. Lantern slides were also used to show the properties and typical applications of the non-ferrous nickel alloys.

◆ Appoint Testing Committee for Containers

A sub-committee to the committee on Paper and Paper Products of the American Society for Testing Materials, to deal with paper shipping containers was formed during A.S.T.M. committee week in Chicago.

Don L. Quinn, of Chicago, has been designated chairman of the sub-committee and C. P. Barker of the Container Corporation of America elected secretary. Tests of paper and paperboard of particular significance in the construction of containers, questions of humidity and temperature control during testing and the significance of moisture content to strength properties will receive the first attentions of the committee.

◆ N. W. Division Supers Hold Spring Meeting

The Northwest Division of the American Pulp and Paper Superintendents Association, Inc., will hold its spring meeting on May 22 at Appleton, Wis., under the guidance of Peter E. Jones who is general chairman for the convention.

Beginning May 21 M. J. Taylor and C. E. Saecker will register those attending the meeting, at the Conway Hotel, which will be the convention headquarters for the association. Messrs. C. J. McMahon and Fred Kranhold are working with the hotel to see that everyone is taken care of.

The program for the convention includes a meeting Saturday morning in the Conway Hotel, at which time Mr. Fitzgerald of the Hercules Powder Company will speak, a noon luncheon at the Butte des Morts Country Club, a golf tournament at the country club, visits to various points of interest in the valley, a banquet to be held in the Conway's Crystal Ballroom, and a ladies' luncheon and bridge to be held at the Riverview Country Club.

◆ Henderson Now With Kieckhefer

W. W. Henderson, who has been assistant to J. H. Allen, vice-president of the Union Bag & Paper Corp., Savannah, Ga., became associated with the Kieckhefer Container Company at Plymouth, N. C., on May 1.

During his connection with the Union Bag & Paper Corp., Mr. Henderson was in charge of construction and operations. He will act in the same capacity at Plymouth.

◆ Act to Foreclose On Outagamie Mill

Foreclosure proceedings have been started on the abandoned Outagamie Paper Mill, owned by Patten Paper Company, Ltd., Kaukauna, Wis., by The First Trust Company of Appleton, according to a report to the Outagamie county board of supervisors. The sale of the mill had been urged recently by Mayor John Niesen of Kaukauna, who declared at the time that the mill was not protected against fire either by insurance or watchman and that it had no sprinkler system in operation. The county is interested in the sale of the mill because it has about $75,000 due in delinquent property taxes which it hopes to collect if the sale is made.

◆ WILLIAM K. CLOW, JR., is now associated with the technical staff of the Elgin Softener Corporation, Elgin, Ill. Mr. Clow was the former general manager of the Henszey Company, Watertown, Wis. He is widely known for his work in the field of water conditioning and has had years of experience regarding the intricacies of steam power plant operations.

◆ A MODERN SAVE-ALL, which will aid in the retention of valuable material in the white waters, has been installed on No. 6 machine of the Nekoosa-Edwards Paper Company, Port Edwards, Wis.

◆ N. Y. Tappi Unit Requests Local Charter

The first spring meeting of the Provisional New York State Section of Tappi was held on April 17 at the Hotel Syracuse, Syracuse, N. Y. Professor C. E. Libby of the New York State College of Forestry presided as chairman of the section in the absence of John Schuber.

Following the dinner there was a short business session at which a committee was appointed to make the necessary preparations for petitioning the national organization for a local charter and arrangements were made for the nomination of officers and standing committees to serve during the coming year.

A sound motion picture film, "Two Related Industries," which described the steps taken in the manufacture of felts, was presented by Curtis Haskings of the F. C. Huyck & Sons Company. Following the showing of this film Dr. E. H. Rees, director of research with F. C. Huyck & Sons, answered numerous questions which were raised concerning the preparation and use of papermaking felts.

◆ TWELVE YEARS ACTIVELY engaged in distribution and advertising for the Scott Paper Company, Harry C. Pardee has recently been appointed advertising manager for the latter firm, succeeding William W. Tomlinson who has resigned from the company. Mr. Pardee became assistant advertising manager in 1934 and during Mr. Tomlinson's leave of absence for the past year has been acting advertising manager of the business.

◆ Southern Kraft Corp. Plans Another Mill

That Southern Kraft Corporation plans to build another mill in the south is now a definite assurance as a result of an official announcement made recently by the company. The new mill will have a yearly capacity of 22,000 tons of kraft board and it is expected that it will go into production about the middle of 1938. Contracts have been given the Beloit Iron Works, Beloit, Wis., for two specially designed high speed fourdrinier machines which will be used at the mill but information regarding the definite location of the plant has not yet been given.

◆ Simplified Practice Recommendation in Print

Copies of Simplified Practice Recommendation R44-36, Box Board Thicknesses, are now available and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents each.

The present edition is based on the current standards of the National Paperboard Association, and applies essentially to changes in the thickness of various kinds of box board to meet present needs. Definitions have been added for completeness.

This recommendation is effective from December 31, 1936, and is subject to regular review by a standing committee of the industry.

◆ GEORGE CARROLL, former superintendent of the American Writing Paper Company, has gone to Bennington, N. H., to become general superintendent of the Monadnock Paper Mills there. Frank Borlen, assistant superintendent of the former concern, will become superintendent in Mr. Carroll's stead.

◆ Clark Heritage Leaves Oxford

Clark C. Heritage, who has been technical director at the Oxford Paper Company, Rumford, Maine, has accepted an appointment as development engineer for the Wood Conversion Company, associated with the Weyerhaeuser interests, Cloquet, Minn.

Mr. Heritage is one of the best known technical men in the industry. He is the latest past president of the Technical Association of the Pulp and Paper Industry.

◆ AFTER TWENTY-SIX YEARS affiliation with the Foxboro Company, Foxboro, Mass., makers of industrial precision instruments, and having served as sales manager for the firm since 1920, C. E. Sullivan has recently been appointed vice-president. Mr. Sullivan has been instrumental in the rapid growth of the company and the expansion of its line to include a complete line of indicators, recorders and controllers for temperature flow, liquid level, pressure and humidity.

◆ LONG CONNECTED WITH the Patterson Foundry & Machine Company, East Liverpool, Ohio, D. M. Wilhelm, a member of that company's production department and later in charge of sales in New York, is now in charge of Patterson's new Pittsburgh office located in the Bessemer Building there. The new office will maintain an engineering department as well as a district purchasing department.

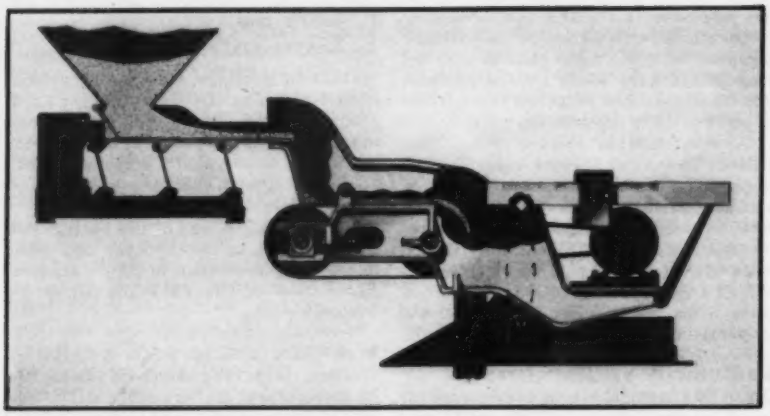
◆ A FORMER CHEMIST and research engineer for the Maine Seaboard Paper Company, Bucksport, Me., Kenneth J. Kimball has recently joined the engineering staff of the Improved Paper Machinery Corporation at Nashua, N. H.

◆ C. H. R. JOHNSON, formerly general superintendent of the Peninsular Paper Company, Ypsilanti, Mich., is now associated with the paper division of the Raybestos-Manhattan, Inc., as sales executive and is located at the Manchester, Conn., plant of the latter company.

◆ Chinese Paper Plant Nears Completion

Construction on the paper mill of the Kwangtung Provincial Government at Naam Shek Tou, Honam Island, about five miles south of Canton, is nearing completion and the mill is scheduled to commence operations on July 1, 1937.

The mill, which reports a capital investment of approximately $1,600,000, covers an area of about 82 acres and will employ over 1,000 workers. It will have a daily capacity of 50 long tons of newsprint paper and arrangements have been made to enable the machinery to produce book paper, drawing and heavy paper. Chinese pinewood secured from the North and West river regions can be utilized in the manufacture of this paper.

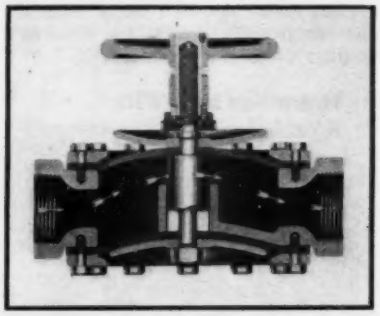


◆ Precision Weighing Machine

Jeffrey Manufacturing Company, Columbus, Ohio, has announced a precision machine for continuous weigh-feeding, proportioning and batching. This machine, called the Waytrol, combines an all-electric vibrating feeder, a synchronous weigh-belt on a scale beam so pivoted as to receive material at the most sensitive end, and an automatic all-electric control. The weight-belt travels at a constant speed while the rate of feed is governed directly by weight. Any slight unbalance of the belt makes correction by speeding up or slowing down the vibrating feeder. This machine, weighing to within one per cent of absolute and available in sizes handling up to many tons per hour, operates from any standard 60-cycle circuit.

◆ Balanced Diaphragm Valve

The McAlear Manufacturing Company, 1901 South Western Avenue, Chicago, Ill., has developed a balanced diaphragm valve which, it is claimed, will close off tight, repeatedly, in service on fluids or gases containing foreign matter. Various composition products may be

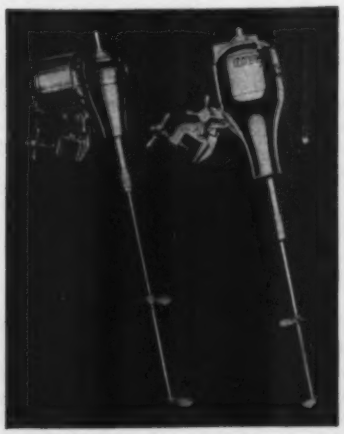


used for the diaphragm, while either ferrous or non-ferrous materials are used for the rest of the valve. The design permits operation in any position as well as a change of diaphragm without removing valve from line. It is made in sizes of two inches and larger and can be hand or motor operated.

◆ Portable Power Mixer Line Redesigned

The Patterson Foundry and Machine Company, East Liverpool, Ohio, has redesigned its entire line of Typhoon portable power mixers.

A reduction in weight has been attained by the use of aluminum in construction. Polished aluminum and chromium plate finish is employed



throughout. Frames, end bells and lower housings of motors on direct-driven units are of polished aluminum. Geared units have aluminum frame motors built into chromium plated cases containing bronze ball bearing gear reducers.

All of the motors are of the fan-cooled, down-draft, self-ventilating type with starting switches built inside of motor frames.

Heavy duty guide bearings support the adjustable propeller shafts.

◆ "Plug-in" Instrument for Industrial Use

Industrial plants, particularly those powered by individual drive, will benefit by the newly developed plug-in instrument whose self supporting socket can be mounted directly in the wiring conduit with a 35% saving over a conventional installation, according to Westinghouse engineers. With four years' development behind it, the present universal socket will give any desired load conditions by merely plugging in an ammeter, voltmeter, watthour meter, etc., one after another in the same

socket. Standard "troughs" (all metal boxes), with several sockets, will be used when more than one instrument is to be read at the same time, and can be mounted much like a motor starter. Quick and easy mounting has been worked out for ordinary wiring, such as rigid conduit, open wiring or cable.

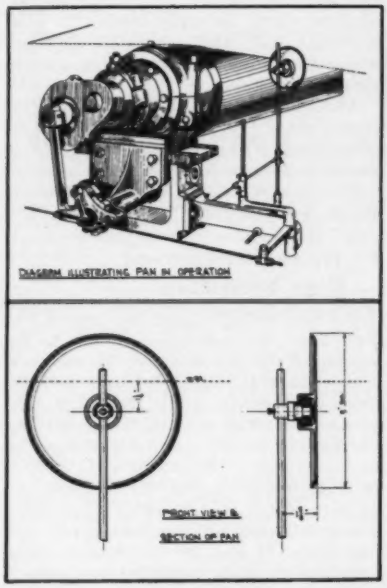
◆ Chlorinator Line Extended

A new line of chlorinators in which a rota-meter with silver rotor is incorporated into the design has been placed on the market by the Everson Manufacturing Company, 214 West Huron Street, Chicago, Ill. These chlorinators come in two styles, skeleton and enclosed, and in capacities from one-half of one pound

to one thousand pounds of chlorine per 24 hours. Each model has a ratio of one to ten between its minimum and maximum capacities and meters to an accuracy of within one per cent. Safety features in the line, as cited by the manufacturer, include automatic venting devices; automatic vacuum break and non-corrosive valves, lines and fittings; and, in a de luxe model, a bell jar covered rota-meter assembly.

◆ Wire Guide Pan

A wire guide pan, designated as the FAW, has been developed by Frank A. Walker, 309 Broad St., Tonawanda, N. Y. This pan consists of a flat metal disc, which is backed at its center with a bearing housing that retains a double row ball bearing which is sealed against water or dirt and which is supported by a short extended non-revolving shaft. The disc,



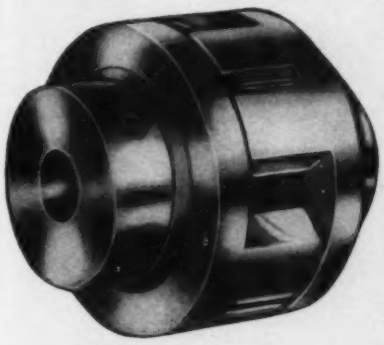
5 inches in diameter, has an edge that is rolled outward into a flange. The outer end of the shaft is machined to permit installation on different types of wire guides now in use. In making an installation, the device is set so that the disc is set flat against the wire at a point about 1¼ inches above its center. Change in speed of the pan is effected by raising or lowering it from this position. It is claimed that the pan will last indefinitely if the bearing is greased once in two months; that the first pan to be installed has been running for the past three years on a machine running between 400 and 700 f.p.m.; and that the device is being used on machines operating at speeds as high as 1500 f.p.m.

◆ Insulating Refractories Development

Quigley Co., 56 W. 45th St., New York, N. Y., has developed a group of eleven insulating refractories from a calcined fire clay base material known as Insuline. These products are stated to possess properties of light weight and extremely low heat storage capacity in addition to high insulating qualities. One product, Insulbrix 2600, for example, is an insulating fire brick that is claimed to be suitable for service temperatures up to 2600 deg. Fahr. It also is stated to have one-seventeenth the heat storage capacity of heavy refractories for the same heat flow, and that one inch has an insulating value of five inches of fire brick.

◆ Fractional Horsepower Flexible Coupling

John Waldron Corporation, New Brunswick, N. J., has developed a new coupling as an addition to its Francke line for application to shafts up to ¾-inch diameter and for fans, fuel pumps,



generators, etc. up to ¾ hp. at 1800 r. p. m. This coupling is torsionally resilient, mechanically flexible, and silent at any speed. It provides free and independent lateral floating of the connected shafts, accurate alignment surface, large load carrying surfaces, and an assembled one-piece all steel center member.

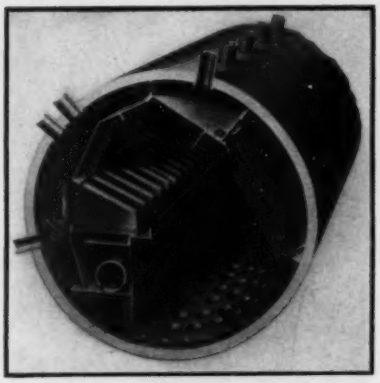
◆ Car Door Opener and Closer

A one-man car door opener and closer, known as the Signode car door opener, has been developed by the Signode Strapping Company, 2600 N. Western Ave., Chicago, Ill. The device, weighing only 15 lbs., consists of a combination of ratchet pulley and hook and a steel chain with hook at one end and hand ring at the other. In operation the hook on the end of the chain is fastened to some object at the end of the car toward which the door is to be moved, and other hook to the door handle. Then the chain is drawn taut through the ratchet pulley

and a downward pressure applied to the middle of the taut section. This pressure causes the door to slide, the resulting slack in the chain being taken up by hand through the ratchet pulley and the operation repeated until the door is in the desired position. The manufacturer states that the device, which has the endorsement of leading safety engineers, can be operated with equal efficiency from the ground or loading platform.

◆ Bubble-Type Steam Washer

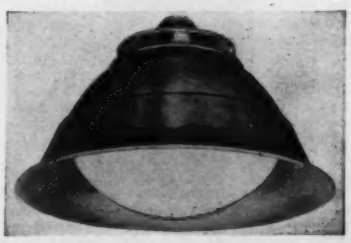
A steam washer, which functions on the principle of removing entrained solids from steam by forcing it to bubble through clean feedwater, has been developed by the Combustion Engineering Company, Inc., 200 Madison Ave., New York, N. Y. In this design of steam washer (see illustration), the feedwater enters trough at lower left through longitudinal perforated pipe and spills over notched weir. Mounted over the trough are a series of hoods or com-



partments, open at bottom and left and having perforations near the bottom of the side walls. These hoods are joined together by plates at the left and over them is bolted a continuous plate which extends to the top of the drum. Thus the steam entering the drum through the tubes at the left is compelled to pass into the hoods and out through the apertures into the feedwater. The actual washing of the steam is obtained not alone by its bubbling through the water but also by its violent mixing with it. Construction of the washer is such as to prevent comingling of the feedwater with the water in the drum. The screen at the right is for the removal of moisture that may be carried along with the steam.

◆ 400 Watt Combination Mercury-Incandescent Lighting Unit

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has placed upon the market a 400 watt combination mercury-incandescent lighting unit for applications of industrial lighting where color correction is desired.

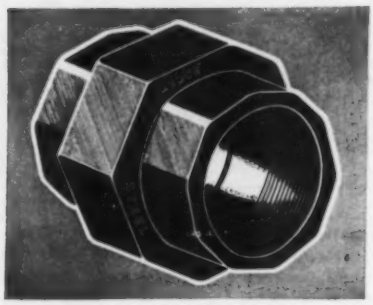


The complete unit consists of an aluminum reflector with socket assembly and a monax diffusing banded glass bowl. The socket assembly, which consists of three sockets for incandescent lamps of

not over 150 watts each and which are spaced about a special skeleton socket for the 400-watt mercury lamp, is attached directly to the top of the reflector. A slip type louvered cover provides ventilation for the sockets and allows for wiring or inspection of wiring after reflector is hung. It is arranged for mounting on ½-in. conduit and for mounting heights of 12 to 18 feet. The diffusing bowl is banded at the fitter and hinged in the reflector. A simple catch locks globe securely in position; while a felt gasket provides dust-proof joint between the glass and reflector.

◆ New Pipe Union

Rockwood Sprinkler Company, 38 Harlow Street, Worcester, Mass., has placed upon the market a new pipe union that is recommended by the manu-



facturer for 600 lb. working steam pressure, 2000 lb. hydrostatic pressure, and 900 deg. Fahr. The union, designated as Dualsteel, has a tensile strength of 80,000 lb., a Brinnell hardness of 180, and is completely Parkerized.

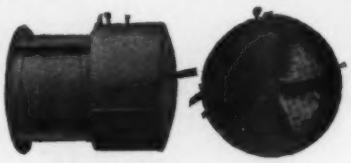
◆ Fractional Horsepower Air Compressors

Ingersoll-Rand Company, Phillipsburg, N. J., has announced a new line of fractional horsepower air compressors. These units, made in ¼ and ½ horsepower sizes, are compact, have automatic start

and stop control; and are equipped with a new style seamless steel tank and an improved check valve. They are rated for 150 pounds per square inch maximum pressure, but may be set for lower pressures, or may be equipped with a reducing valve for still lower pressures. Both the ¼ and ½ horsepower units are available on a 2.4 cu. ft. tank, while the ½ horsepower size also is available on a 4.6 cu. ft. tank in either vertical or horizontal mounting.

◆ Compound Motorized Blower Unit

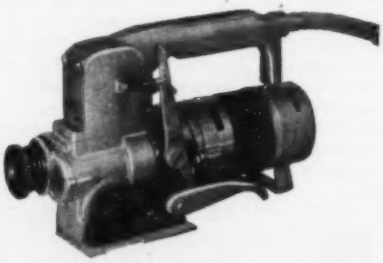
L. J. Wing Manufacturing Company, 14th Street and 7th Avenue, New York, N. Y., has developed a blower unit in which two propeller type fan wheels are mounted on the double extended shaft of



a constant speed electric motor, one on either end, and between which is an integral damper control and air re-directing mechanism. A cylindrical casing, arranged for accessibility, houses the assembly. The unit is designated as Type COM blower.

◆ New Electric Strapping Tool

Signode Steel Strapping Company, 2600 N. Western Ave., Chicago, Ill., has announced a new electric strapping tool. This tool, designated as the Signode electric stretcher and powered with an A. C.-D. C. reversible electric motor, operates with either hand, and has fingertip control. A full length base with



rounded front edges enables the tool to ride smoothly over cross-strapping or any other uneven surface of the container being strapped. It is recommended by the manufacturer particularly for shipping rooms where large, heavy containers predominate and where speed of operation in production is required.

◆ Boiler Feed-Water Level Control

J. A. Campbell Company, Box 851, Long Beach, California, has announced the development of a feed-water level control. This control, designated as the Campbell-cantilever boiler feed-water level controller, is made in one size which is claimed to meet all boiler needs and which is said to operate any valve up to 12 inches. Installed on the side of the boiler, the frame of the control is set so that the water level mark is at the same level as the desired water level in the column. When the water level drops in the gauge glass, water runs down an inclined tube and becomes exposed to the high temperature of steam at boiler pressure. Rapid expansion of this water causes the end casting of the control to move upward and to open the valve by an amount equal to eight times the extent of the expansion. If the water rises in the gauge, the cooling action of the water rising in the tube causes contraction which lowers the end casting and closes the valve by an amount equal to eight times the contraction. The control may be operated with or without a whistle or an electric signaling device.

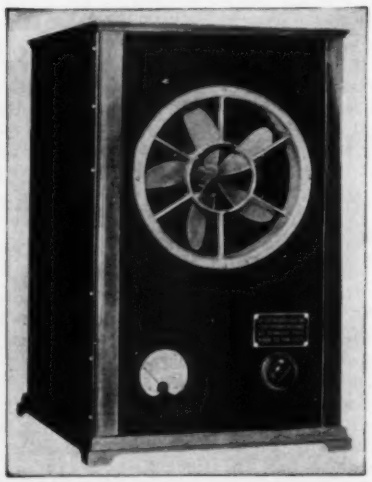
Another application for the control, mentioned by the manufacturer, is in connection with evaporators where it permits condensate to be discharged at a rate equal to that of formation without steam blow through.

◆ Water Sterilizer and Slime Preventive

Oakite Products, Inc., 22 Thames St., New York, N. Y., has announced the development by its Research Division of a new material known as Oakite Airefiner, for keeping sterile the water used to wash or scrub air and for preventing the growth of slime and algae deposits in the system. This material is said to be completely soluble, to transmit no odor to water or air, and to provide a stable, colorless solution that is safe and non-toxic. It also is stated to be non-corrosive to metal surfaces and that it helps prevent water scale formation.

◆ Ozone Generator Development

The Electroaire Corporation, 1455 W. Congress St., Chicago, Ill., has placed upon the market a new model of ozone generator. This model, utilizing Bakelite panels trimmed with chromium



plate, is manufactured in two sizes—one of 8,000 cubic feet and the other of 20,000 cubic feet capacity. Incorporated into the design is a "Roto-Beam" circulator which is stated to be as effective in ventilation as six to eight conventional type fans.

◆ New Catalogues and Publications

Allis-Chalmers Manufacturing Company, Milwaukee, Wis.—A new bulletin, No. 1910, illustrates in a brief but compact manner the different blowers and compressors made by that company.

Bijur Lubricating Corporation, Long Island City, N. Y.—A well-organized bulletin is presented which adequately describes three types of lubricators built by the company. The many illustrations serve to clarify many points connected with the field of lubrication.

Black-Clawson Company, Hamilton, Ohio.—A folder which is concerned with important data regarding calenders and the attention which should be paid to finishing equipment has been published recently by the company.

Brown Instrument Company, Philadelphia, Pa.—A deluxe booklet describing the various types of pyrometers built by the company and how each serves a specific need for a special purpose, has been issued lately. Installation of as well as actual operation of the pyrometers is discussed at length.

Chain Belt Company, Milwaukee, Wis.—*How to Handle It* is the title of a very attractive data book issued recently by this company. Spiral-bound with a stiff cover, the catalogue contains 114 pages of detailed information regarding the employment and construction of belt conveyors. Statistical tables, graphs, drawings, together with many excellent photographs and well-worded literature, make this presentation a thing of value to any industry.

Cleveland Tramrail, Wickcliffe, Ohio.—The company has ready for distribution a leaflet which illustrates modern methods of handling materials by means of overhead equipment.

Combustion Engineering Company, Inc., New York, N. Y.—Description and adaptability of steam generators is the theme of a recent publication by this firm. Cross-sectional drawings serve to give the reader a clear picture of the different features incorporated in a steam generator.

Cornell Iron Works, Inc., Long Island, N. Y.—A new twelve page catalogue describing the employment of rolling doors and grilles has been published recently. The catalogue illustrates the action of folding and upward acting doors and presents a detailed picture of the installation of same.

Downingtown Manufacturing Company, Downingtown, Pa.—Catalogue No. 118 uses literature, photographs and diagrams to illustrate the construction and employment of suction felt rolls. Precise explanations regarding the product are featured throughout the new publication.

Esterline-Angus Company, Indianapolis, Ind.—A new bulletin describes this company's complete line of graphic instruments. Through eighty-eight pages the book shows seven types of instrument cases, twenty-one different chart drives and twenty-four kinds of meter elements.

Fafnir Bearing Company, New Britain, Conn.—A recent circular illustrates the use of the motor cartridge when plain bearing motors have failed or when they become inefficient. The literature points out the principle of the ball bearing and shows how a cartridge unit may be converted to fit the machine.

The Gerrard Company, Chicago, Ill.—A pictorial catalogue which explains carloading methods is the latest offering of this company. Series of pictures and explanations illustrate fully the use of wire strapping in carload stowage.

Haynes-Stellite Company, Kokomo, Ind.—This company, a unit of the Union Carbide and Carbon Company, has presented a deluxe catalogue pertaining to types and styles of cutting tools. Bound with a varnished cover with color running through the entire edition, the catalogue is profusely illustrated by action and display photographs and contains such special features as blueprint explanations and tool specifications.

Lawrence Pump and Engine Company, Lawrence, Mass.—A folder which contains the construction features and performance tables for a new centrifugal pump has been published recently by the company.

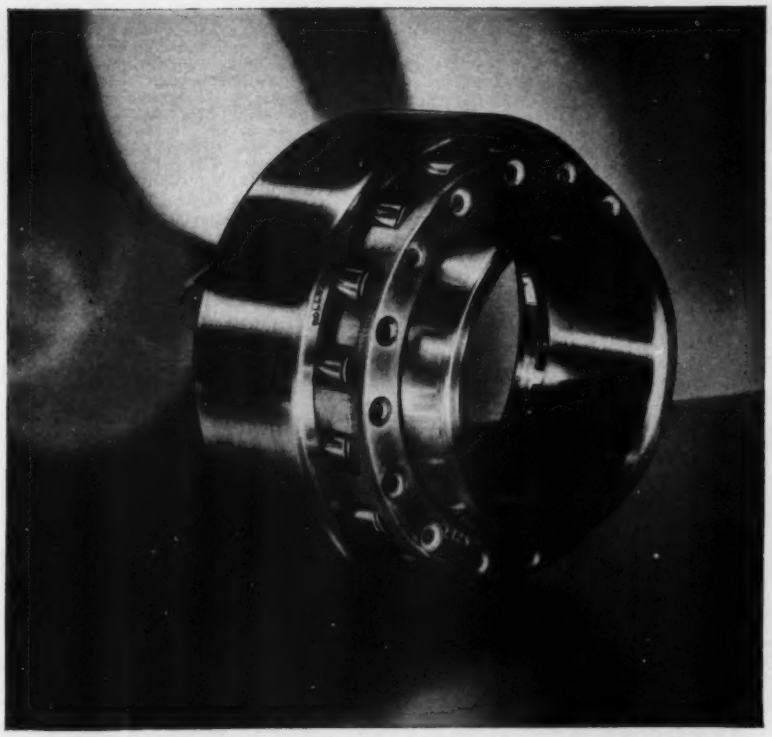
Lewis-Shepard Company, Watertown, Mass.—A small colored folder relating to lift trucks and lift truck platforms for the interior transportation of materials has been issued by this company.

Lignum-Vitae Products Corporation, Jersey City, N. J.—A new pamphlet dealing with the hard-wood bearings the company manufactures has been released recently by the company.

Norton Company, Worcester, Mass.—A handy fifty-two page booklet which fully describes the grinding tools that the company manufactures has been presented recently. Detailed explanations and excellent photography are features of this 5x7 inch presentation.

Patterson Foundry and Machine Company, East Liverpool, Ohio—An attractive publication illustrating the company's pebble and ball mills is the latest catalogue offering of this company. A multicolored glazed cover binds thirty-two pages of well-written material and exceptional photography, all of which serve to give the reader a complete understanding of the product thus described.

Quigley Company, Inc., New York, N. Y.—A pamphlet demonstrating the use of protective coatings for steel has been issued by the company. The use of photomicrographs illustrate the action of corrosion on metal while other features point out the various types of constructions on which the company's product may be used. The use of their product on burners as a heat-resisting element is discussed in relation to the hog-fuel used in the lumber industry.



BETTER THAN "GOOD ENOUGH"

Rollway Bearings are not built for engineers content to specify one bearing as "good enough" for all purposes. The greater efficiencies of Rollway cylindrical roller, radial, and thrust bearings for certain applications are for the engineer interested in increasing the all around accuracy of his specifications. Our wide experience as bearing specialists is yours for the asking. A Rollway Analysis is the first step. It costs you nothing and may save you much. Write—

ROLLWAY BEARING CO., INC., SYRACUSE, N. Y. Factory Representatives in — Boston, Chicago, Cleveland, Detroit, Philadelphia, Pittsburgh, and Youngstown. Agents: Houston, Texas; Tulsa, Okla.; Birmingham, Ala.; Precision Bearings, Inc., Los Angeles, San Francisco, Portland and Seattle.

CYLINDRICAL ROLLER ROLLWAY BEARINGS

Samuel C. Rogers & Company, Buffalo, N. Y.—Information, prices and specifications of saw and knife fitting machinery are fully given in a leaflet distributed by the company.

C. J. Tagliabue Manufacturing Company, Brooklyn, N. Y.—A new line of high-speed photo-electric pyrometers is presented in a recent catalogue which devotes sixteen pages to illustrations and explanations of the invention.

Warren Steam Pump Company, Inc., Warren, Mass.—A folder whereby the reader may examine the interior workings of a centrifugal stock pump by use of a sectional view of same is being circulated by this company.

BOOKS

A Dictionary of Paper and Papermaking Terms—Various glossaries and trade dictionaries of paper have appeared from time to time, but nothing hitherto published can compare for scholarship or utility with **A Dictionary of Paper and Paper Making Terms** by E. V. Labarre. The volume comprises 388 pages of text and 45 inserted samples of paper and pulp. The latter feature is of especial significance to persons not thoroughly acquainted with paper of all sorts, for paper beggars verbal description, and only actual samples suffice to make one acquainted with the many varieties produced.

To the technical student or translator this work will prove indispensable, for in it are found the French, German, Dutch, and Italian equivalents of the words and terms of the English. Of particular interest to those who value information concerning the history of paper and papermaking are the fifty pages covering "The Story of Paper and Papermaking." It is a brief but well documented account, enriched by a bibliography containing 187 references in English and foreign languages.

As Mr. R. H. Clapperton, the well-known British paper authority, says in the foreword: "All those concerned with paper will readily agree that their trade is sufficiently ancient and important to have a standard dictionary of its own. I am quite sure that this very able contribution to the literature of our industry will be appreciated and, what is more important, made good use of, by all makers and users of paper in those countries covered by the various languages which the author has given in his work."

N. V. Swets and Zeitlinger of Amsterdam, Holland, are the publishers of the volume but inquiries originating in the United States may be addressed to Lathrop Paper Company, 155 Perry Street, New York, N. Y.

Beitrage zur Kenntnis des Sulfitzellstoff-Verfahrens.—(Contributions to the knowledge of the sulphite pulping process.) This little monograph is the work of Carl R. Bergson, the well-known chief engineer of Sörstafors sulphite mill in Kolback, Sweden. Its contents result from the technical experiences of the author himself, and they present his viewpoints, and his experimental data, and his own discoveries in the mill. The booklet is divided into two main sections: (1) the production of sulphite liquor, and (2) the digestion. Under (1) the author defines his terms (he distinguishes between "tower acid" and "cooking acid," etc.), outlines the recent nomenclature, methods of analysis of the acids, the production of sulphur dioxide, the absorption towers, the use of limestone, and the control methods used in the acid plant. Under (2), Bergson describes the wood used, the wastage, the respective yields obtained with autoclaves and in commercial mill cooks, methods for regulating the degree of pulping, control of the time of digestion, means for obtaining standard quality even when different digesters are used, sulphur consumption and recovery, automatic temperature and pressure control and the patented Bergson method for sulphur and heat recovery. He also takes up the technique of digestion, the absorption period prior to delignification (a section particularly well handled), the results obtained in cooking with various compositions of cooking acid, and the significance of the composition of acid on the quality of the pulp. The author writes trenchantly and with assurance. He is strongly in favor of the modern direct cook in preference to indirect cooking. The book of 61 pages, contains 25 illustrations, numerous tables, and ample mathematical treatment. It is published in 1937 by Günnter-Staib Verlag, Biberach an der Riss.

Methods of Determining Gloss—This handbook issued by the U. S. Department of Commerce, is part of the Journal of Research of the National Bureau of Standards and was written by Richard S. Hunter. First presenting the various definitions of "gloss" the author continues his explanations of the subject illustrating six types of gloss that have been classified. The six types which Mr. Hunter discusses are: specular gloss, sheen, contrast gloss, absence-of-bloom gloss, distinctness-of-reflected-image gloss, and absence-of-surface-texture gloss. In addition to the written matter concerning these types Mr. Hunter uses a table to further amplify his deductions. By use of photographs and diagrams the distribution of light in its relationship to the subject is clarified and to complete his work Mr. Hunter has summarized and condensed his material wherever possible. A bibliography on gloss is to be found at the end of the handbook. Copies of this work may be obtained from the Superintendent of Documents, Washington, D. C.

Selbstkostenrechnung in Papierfabriken.—(Calculation of costs in paper mills.) This is the third edition of a book by Karl Beck. After a brief resumé of the general methods used in industrial calculations, the author focuses his attention specifically on the paper industry. He discusses paper production and assumptions that must be made in the technique used. Raw materials are briefly described; then follows a discussion on moisture content, losses on the papermachine, the waste and the yields, the balance sheet of materials (die Stoffbilanz). Next come the type of beating used with emphasis on the power consumption, the format, the weight per square meter in grams, the speed of the papermachine, the capacity production of the mill (with the method used in computing costs per 100 kilos), the demands of the customer, the location of the mill. (These items are given in the order in which they appear in the text.) Subsequently there is a very detailed account for computing costs, both in mills turning out a single product, and mills turning out various products. There is a section on book-keeping methods, on detailed costs (e. g., taxes, fixed charges, wages, salaries, etc.), the cost of heat power, water, etc., the cost per "papermachine hour," the finishing of the paper (which evidently refers to calendering, reeling, slitting and rewinding), sales costs, further treatment of the paper (which refers rather to its use in carton, coating paper, etc.), operations leading to raw material production (i. e., pulp grinders, straw pulp manufacture, etc.), calculation of costs under conditions of varying output. The author ends his book by discussing the technique of cost computation, and special problems. He also adds a brief bibliography. While the organization of the material leaves something to be desired, there is no question regarding the fact that Mr. Beck has rendered a real service to the German mill superintendent and the owner. The text is well illustrated with sample cost sheets, forms to be used, flow-charts and graphs. The price of the book (in Germany) is 4 R. M. It is neatly printed and is published by the Günnter-Staib Verlag, Biberach an der Riss.

Standards of Hydraulic Institute—The seventh edition of this publication, recently released, is a larger work than any of its predecessors. Likewise, the material of the former editions which it contains, has been rewritten and rearranged to bring it up to date and much new material has been added. The new material includes a new pump test code, charts for figuring friction of petroleum products in pipe lines, specific pump speed curves, pressure-temperature curves for pumping hot water, and chart showing resistance of valves and fittings to flow of liquids. The book, obtainable through C. H. Rohrbach, Secretary, Hydraulic Institute, 90 West Street, New York, is priced at $1.00 per copy.

Study of the Effect of Fiber Components on the Stability of Book Papers—This booklet, issued by the U. S. Department of Commerce, reports the results of tests of a number of pulps commonly used in the making of fine printing papers as regards the stability of experimental papers made from them. The fibers used were representative commercial materials and consisted of four kinds of purified wood pulp, soda and sulphite pulp, new rags and old rags. The composition of the beater furnish was 85 per cent of fiber and 15 per cent clay, the proportion commonly used in book papers. The equipment and processes used, the test methods, the analyses of the materials used and the data on the papers made constitute the subject matter of the booklet which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents.

Stumpage and Log Prices—This statistical bulletin (No. 57) published by the United States Department of Agriculture is a price record of stumpage and logs for the calendar year 1935 the material of which has been complied by Henry B. Steer, senior forest economist, Division of Forest Economics, Forest Service. Following an introduction which enters into a discussion of market prices and a sales classification of stumpage and logs the author presents a series of tables which illustrates the total stumpage and log sales reported, by species and type of sale, during 1935. The tables are divided into six parts which fall under the headings of: species and type of sale, transactions, quantity, value, average price per Mft. b.m., and distribution by volume. Other tables, listed by species, illustrate the prices per thousand feet board measure. These tables have three headings and six sub-headings. The states are listed alphabetically and under the heading of stumpage are divided: all sales, second growth, and price range all sales. Under the heading of logs are listed: all sales, lumber logs, and price range all sales. Farther on in the bulletin Mr. Steer has listed the percentage distribution of volume and number of transactions in stumpage and log sales according to price-range class, by species. This handbook, covering some fifty-six pages of statistical material, may be procured from the Superintendent of Documents, Washington, D. C., for ten cents.

Troubles of Electrical Equipment—H. E. Stafford, the author, has incorporated in one convenient volume most of the articles which have appeared under his name in various technical and trade journals. This material, based on an experience of over thirty years as an erecting and maintenance engineer and brought up to date where necessary, has been arranged into seventeen chapters. These chapters treat of troubles and remedies of induction, synchronous and direct current motors as well as of direct current generators. They also cover the operation, maintenance, and troubles of transformers and autotransformers; operation and proper methods of connecting instrument transformers; troubles of air and oil-circuit breakers and relays; industrial motor control; selecting motors for industrial application; operation, maintenance, and troubles of lightning arresters; insulation-resistance tests; factors determining the economic use of power; power factor; handling maintenance and inspection on a schedule basis; value of load survey and how to make it; troubles of voltage regulators; and industrial plant lubrication. It is a volume of more than 300 pages and is priced at $3.00 per copy. The publisher is the McGraw-Hill Book Company, 330 West 42d St., New York, N. Y.

American Chemical Society

Chapel Hill, N. C., was host to the 93rd meeting of the American Chemical Society April 12 to 15.

Following are abstracts of some of the papers presented at the meetings of the Division of Cellulose Chemistry. E. Heuser was chairman of the division; W. O. Kenyon, secretary.

"The Visible Structure of the Cell Walls of the Higher Plants." I. W. Bailey.

Both the primary and the secondary walls of typical cells of the higher plants are composed of a porous but firmly coherent matrix of anisotropic cellulose, whose finer structural details grade down to the limits of microscopic visibility, i.e. 0.1μ or less. "Lignin" and other non-cellulosic constituents may be deposited in the elongated, intercommunicating interstices of the cellulose, thus resulting in two continuous, interpenetrating systems. In heavily lignified forms either system may be dissolved without seriously modifying the continuity or the structural pattern of the remaining system.

The visible structural patterns of the secondary wall are extremely complex and variable and are due (1) to varying porosities in different parts of the cellulosic matrix, (2) to varying orientations of aggregates of chain molecules in successively formed parts of the wall, (3) to variations in the distribution of non-cellulosic substances and (4) in some cases to the presence of non-cellulosic layers.

There are well defined planes of structural weakness in the cellulosic matrix. Thus, the secondary wall may be dissected by various mechanical and chemical treatments into layers, fibrils, fusiform bodies, dermatosomes, and other fragments of varying shapes and sizes. Each of these fragments is heterogeneous and much larger than the finer visible structural details of the cellulosic matrix.

"An X-Ray Diffraction Study of the Action of Liquid Ammonia on Cellulose and Its Derivatives." G. L. Clark and E. A. Parker.

Because of various discrepancies in previous work on the action of liquid ammonia on cellulose and its derivatives, the entire subject has been reinvestigated by the x-ray diffraction method with the greatest possible care and use of the most advanced technique. On this account the x-ray pattern of cellulose swollen with liquid ammonia shows an increase in size of the 101 interplanar distance and is much greater than reported by previous workers. Successive measurements are made of this decrease in distance as the ammonia is evaporated. Native cellulose swollen with ammonia may be completely reverted to original cellulose by treatment with concentrated aqueous ammonia. Swollen mercerized cellulose is only 70% reverted. Slow evaporation of ammonia from the swollen cellulose gives a new modification, Cellulose III, which, like native cellulose, is a meta-stable polymorphic form of crystalline cellulose. The action of heat, dilute and concentrated ammonia, acetic acid and boiling water on Cellulose III was studied. Material derived from native cellulose is easier to revert to the original form than that derived from mercerized cellulose. Sodium hydroxide of mercerizing strength converts Cellulose III from both sources to mercerized or hydrate cellulose. A study was made of the acetylation of Cellulose III and the saponification of commercial cellulose acetates by liquid ammonia.

"X-Ray Studies of Crystallite Orientation in Cellulose Fibers. III. Regenerated Fibers." Wayne A. Sisson.

The earlier investigations on natural fibers (I, Ind. Eng. Chem. 27:51. 1935) and on synthetic fiber structures obtained from bacterial cellulose membranes (II, J. Phys. Chem. *40*:343. 1936) was extended to films and fibers regenerated from various cellulose solutions.

Regenerated films give a mercerized x-ray diagram which shows a selective uniplanar orientation if the swollen film upon drying is allowed to shrink only normal to the plane of the film. In this type of orientation (for further explanation,

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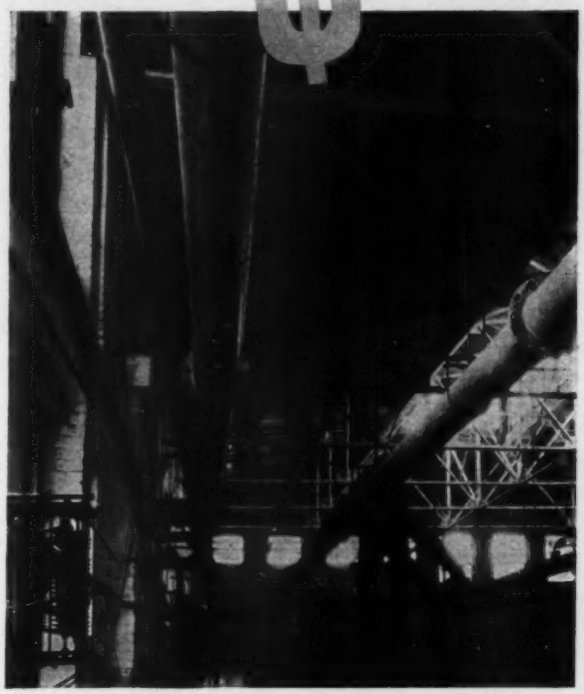

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see II) the 101 crystallographic planes, which contain the largest concentration of hydroxyl groups, are oriented parallel to the film surface. Likewise, rayon fibers, especially viscose, show a similar selective orientation with reference to the fiber surface if spun without tension.

In both films and fibers, stretching destroys the selective orientation of the (101) plane and produces a uniaxial orientation of the *b* axis (axis of cellulose chains) parallel to the direction of stretching.

The x-ray data is compared with optical and chemical data on the same samples. Various ways of explaining the mechanism of formation of the types of orientation found, the conditions under which they may be obtained, and their possible effect on fiber properties are discussed.

"The Existence of Growth Rings in Cotton Fibers." E. A. Georgi.

Some years ago, Balls described the existence of growth rings in cotton fibers. Earlier investigators had probably also seen them but not realized their significance. Since then, a number of papers have appeared, offering a variety of comments regarding not only growth rings but the structure of cotton in general. Recently, papers by W. K. Farr have advanced a new theory of fiber structure. The present paper attempts to show that Balls' original findings are valid and that the growth rings exist as actual structural units. These units appear to persist regardless of the treatment accorded the fiber, since they can be shown to be present in raw cotton, purified alpha cellulose, nitro-cotton, fibrous cellulose acetate, and throughout a reaction such as cellulose etherification.

"The Molecular Weights of Cellulose and Cellulose Derivatives." Elmer O. Kraemer.

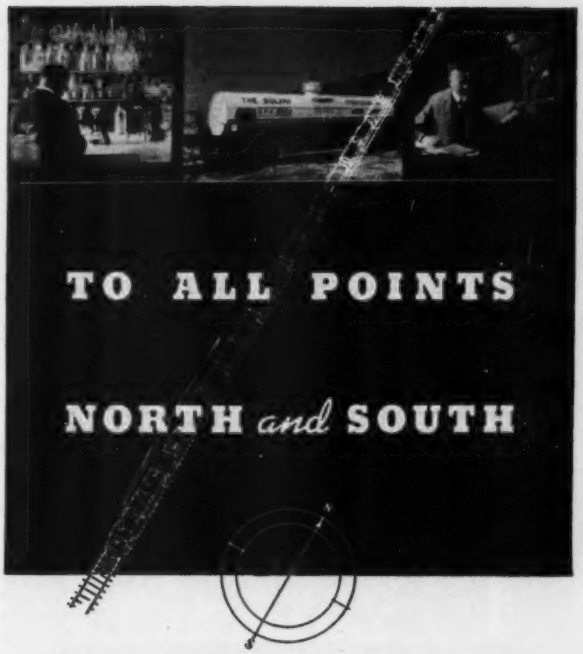
The comparison of the intrinsic viscosities and molecular weights of celluloses and cellulose derivatives, determined with the Svedberg ultracentrifuge, demonstrate that a simple relationship exists between the two when suitable solvents are used. The different viscosity characteristics of various technical cellulosic products represent different degrees of degradation of the native cellulose chain, the range in chain length being about 1 to 10. Observations of sedimentation velocity in the high-speed ultracentrifuge show that cellulosic materials are not homogeneous in molecular weight and the heterogeneity is not of the step-wise or discentenuous character as believed by some investigators. Cyclic conversion of cellulose to cellulose acetate and measurement of the molecular weights and intrinsic viscosities of the products provide very definite evidence that the units in solution are truly molecules in the chemists sense of the term.

"The Growth and Structure of the Cotton Fiber." Donald B. Anderson.

The cotton fiber appears as an outgrowth of epidermal cells in the seed coat. Fibers originate on and after the day of flowering and continue to elongate rapidly for a period of sixteen or eighteen days after this date. Elongation ceases abruptly in all the fibers of a boll, regardless of their age, about sixteen or eighteen days after flowering. The wall of the elongating fiber contains a skeletal framework of cellulose, and pectic compounds as well from the first day of its appearance to the cessation of elongation. The micelles in the cellulose wall are grouped into branching thread-like fibrils which are oriented at right angles to the long axis of the fiber. This structural pattern is uniform over the entire primary wall.

The first evidence of wall thickening is the appearance of a system of delicate branching cellulose threads that wind spirally around the inner surface of the primary wall. The direction of the spiral reverses frequently in the wall. A second layer of branching cellulose threads is deposited upon the first layer within twenty-four hours. The structural pattern of the second layer does not conform to that of the first layer. Deposition of secondary wall material continues for at least twenty-five days and usually for longer periods. After the first few days of secondary thickening a similar pattern appears to be followed in the deposition of wall material.

The mature fiber is distinctly lamellate when swollen under pressure. The lamellae are the result of differences in the density of the material deposited. The variations of density



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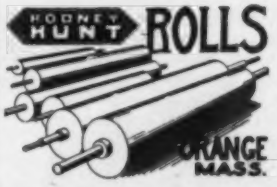

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appear to be correlated with temperature and light. The lamellae can be produced at will by varying either light or temperature.

No cellulose particles were found in the cytoplasm of the young cotton hairs. No evidence was obtained that supports the hypothesis that cellulose cell walls are composed of basic units of visible size cemented together with pectin substances.

"Analysis of X-Ray Diffraction Patterns of Raw Cotton Fiber with a New Photo-Electric Densitometer." Earl E. Berkley.

As a preliminary step in a plan to explore the possibilities of x-ray technique for the rapid measurement of the strength of raw cotton, it has been necessary to develop a sensitive densitometer to study the x-ray diffraction patterns. A densitometer utilizing a photo-electric cell (Photox) as a sensitive unit has been developed and is described. It has a compound mechanical stage, one unit of which is a rotary stage especially adapted for measuring the relative density of the arcs in the x-ray diffraction patterns of cotton cellulose. The instrument may also be used to measure the distance between rings or spots and the relative density of each. Data obtained on a "Hartman microdensitometer" is compared with that obtained on the new photo-electric densitometer. The latter shows a sensitivity approximately five times that of the former. Data showing the effects of density of the patterns (exposure time) on the analysis of the film are reported. A coefficient of correlation of −0.90 was obtained between certain characteristics of the x-ray diffraction patterns and the tensile strength of twenty-one samples of raw cotton fibers. The strength of the different samples, as determined by the Chandler bundle method, ranged from 55,400 to 112,000 pounds per square inch.

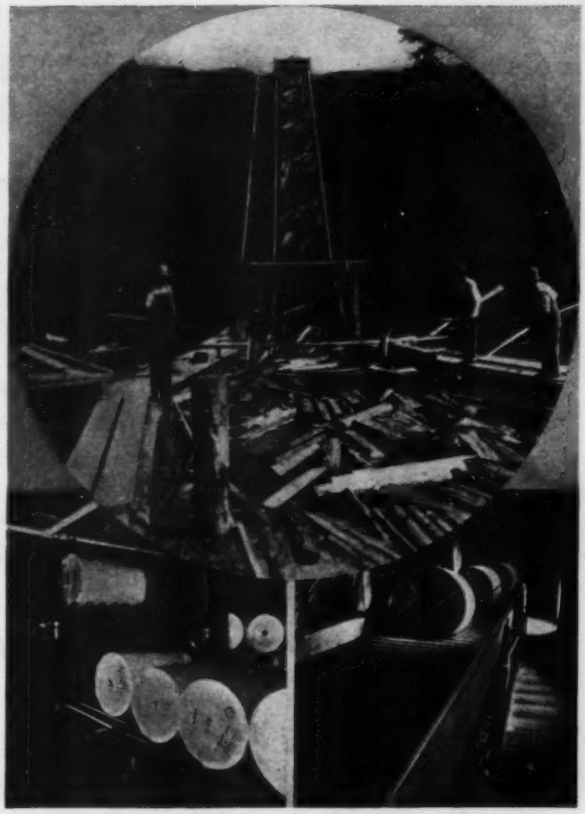
"Cellulose Decomposition by Microorganisms." Selman A. Waksman.

This is a review of the present status of our knowledge of the role of microorganisms in the decomposition of cellulose in nature. A system is proposed for classifying these microorganisms, on the basis of the conditions under which the decomposition processes are taking place, namely, 1. cellulose decomposition in the growing plant; 2. cellulose decomposition in the digestive system of animals; 3. cellulose decomposition in sewage purification and in garbage disposal; 4. cellulose decomposition in soils and in composts; 5. cellulose decomposition in peat bogs and in other standing water basins; 6. cellulose decomposition in oceans, rivers and other flowing water systems; 7. cellulose decomposition in wood, paper pulp and in textiles; 8. cellulose decomposition in industrial fermentations. The nature of the organisms concerned in the decomposition of cellulose under these different conditions is discussed, as well as the role of enzymes in the decomposition process and the formation of intermediary and final products of decomposition. Finally, the significance of cellulose decomposition and its relation to various natural processes are outlined, notably the role of cellulose in the origin of coal and in peat formation; the role of cellulose in the formation of humus in soils and in composts; the decomposition of cellulose in sewage purification and in garbage disposal; utilization of cellulose in the intestinal systems of herbivorous animals, and the influence of environmental conditions, notably reaction, temperature, aeration and nitrogen supply, upon the organisms concerned in cellulose decomposition.

"The Nature of Plant Incrustants." Harold Hibbert.

The author gives a review of the present status of the chemistry of plan incrustants in the light of recent publications by Hilpert and co-workers. The views of these authors denying the existence of pre-formed lignin material in plant products is shown to be based on a misconception of the botanical-chemical aspects of plant structure and plant transformations. After reviewing recent views on plant synthesis including those of Wislicenus and other workers, it is pointed out, in agreement with the recent criticism of Schwalbe and of Schmidt that Hilpert has disregarded the fundamental differences known to exist between the cereals and similar fibres of short time growth on the one hand and those of woody tissues whose growth extends over a very much longer period on the other.

The fact that sugars yield humic acids on treatment with



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Vol. III. Properties of Pulpwood; Preparation of Pulpwood; Manufacture of Mechanical, Sulphite, and Alkaline Pulps; Treatment of Pulps; Bleaching of Pulp; Testing of Pulp

Revised, enlarged Third Edition

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This book, prepared under the direction of the Joint Executive Committee on Vocational Education representing the Pulp and Paper Industry of the United States and Canada, presents a complete, detailed picture of the science and practice of mechanically and chemically making wood pulp. Like other volumes in the series of which it is a part, it emphasizes clarity and thoroughness. The logical, step-by-step development, covering principles, equipment, methods, and data, meets the needs both of beginners and advanced workers in the industry.

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mineral acids has been known for many years and the lignin chemist interested in the isolation of lignin, in recent years, has carefully avoided the use of reagents likely to react with highly reactive carbohydrate material. When such precautions are taken and reagents such as are used in the study of carbohydrate chemistry are employed, it is possible to isolate lignin products which are in part aromatic in character. In the light of present day knowledge there would seem to be no known possibility of an actual synthesis of the latter during the isolation of the lignin.

In this manner it has been possible recently to isolate 1) vanillin, acetovanillone, and syringic aldehyde as degradation products from sulphite pulp liquor and 2) acetone from lignin materials, the work having been carried out in cooperation with Messrs. Wright, Tomlinson, Hawkins, Bell, and Mrs. Buckland. Also it has now been shown, in cooperation with Messrs. Wright and Bell, that the lignin aggregate can be readily isolated by the use of organic acids such or formic and acetic in the absence of a mineral acid.

The extraction of acetylated lignins by the use of a mixture of acetic anhydride, glacial acetic and a small quantity of concentrated sulphuric, under conditions where acetylation but no humicification or lignin formation occurs with highly sensitive sugars is regarded as additional proof of the incorrectness of Hilpert's views.

The author stresses the important role played by fructose in plant metabolism and lignin formation and develops the theory that glucosonic (2-ketogluconic) and fructuronic acid (but especially the former) represent the principal source of isolated lignins. The former exhibits a remarkable sensitivity towards chemical reagents and many of the unexplained reactions relating to pentosans apparently find a satisfactory solution on the assumption that we are dealing not with pentosans but with a highly sensitive type of keto-carboxylic acid.

The present status of the lignin problem is touched upon briefly.

"Pretreatment of Wood with Hot Dilute Acid and Its Effect on Lignin Values." Wilby E. Cohen and Elwin E. Harris.

A study of the influence of pretreatments of wood to remove, by means of hydrolysis, carbohydrate substance which allegedly causes errors in the lignin determination, has been made with the object of determining whether or not lignin is dissolved during such treatments. Hot water, to some extent, and boiling 3 per cent sulphuric acid, to a much greater extent, dissolved lignin from maple wood. An examination of methoxyl contents demonstrated that the substance removed was lignin and not some carbohydrate material which might polymerize to an insoluble residue. All the filtrates gave significant color reactions for lignin with chlorine and sodium sulphite. In addition, the acid filtrates deposited a brown flocculent substance which contained 20.3 per cent methoxyl and which behaved like lignin when chlorinated and subsequently dissolved in sodium sulphite. Spruce wood is reported to be affected in a similar manner. It is recommended that all forms of mild hydrolysis, including treatments with hot water, should be avoided when preparing woods for either the determination or isolation of lignin.

"Removal of Silica in the Pulping of Whole Cotton." D. T. Milne and F. K. Cameron.

In harvesting whole cotton when the plant is dried on the soil, much of the latter adheres and permits throughout subsequent operations. With the cooperation of a manufacturer of harvesting equipment, it has been shown that this contamination can be largely and probably completely eliminated. Exposure to dust, etc., cannot always be avoided and there is some combined silica in stalks and cusps. Stirring or maceration of the comminuted whole cotton in warm dilute sodium caustic solution and subsequent treatment of the washed product with chlorine precipitates a dense silicious deposit from which a suspension of alpha-cellulose can be decanted practically free of silica.

"Water Soluble Cellulose Ethers." L. H. Bock.

A new method of alkylating cellulose has been developed, which consists of dissolving the cellulose in a quaternary ammonium hydroxide and then treating it with an alkyl halide or sulfate. Any quaternary ammonium hydroxide

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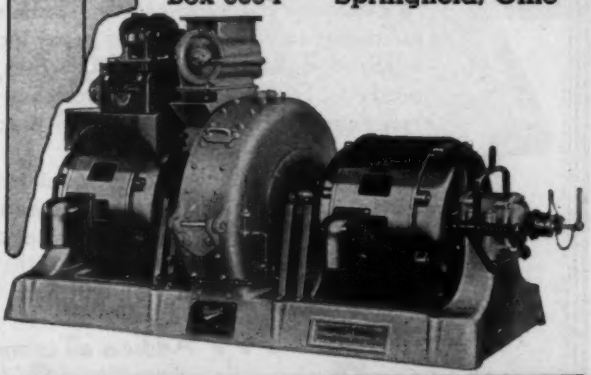

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PAPER AND PULP MILL CATALOGUE

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which contains unsubstituted hydrocarbon groups and which is stable in 40% solution can be used. The benzyl ammonium hydroxides have been chosen as the best solvents for alkylating cellulose.

The alkylation is carried out by mixing cellulose with the quaternary ammonium hydroxide until a smooth solution is formed. The alkylating agent is then added and mixing is continued at room temperature. Water-soluble products have been obtained which contain only 0.6 to 0.7 methyl or ethyl groups to each $C_6H_{10}O_5$ unit.

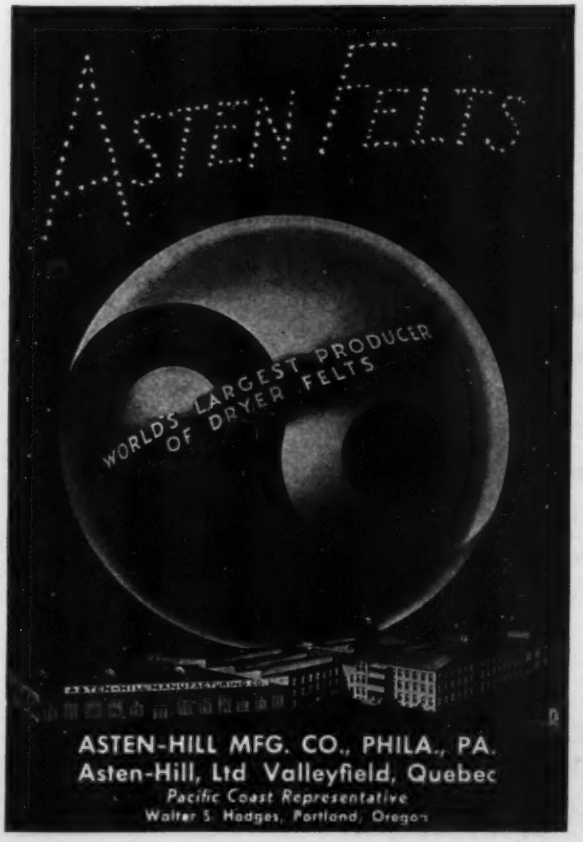
There is a striking difference between the degree of etherification of these cellulose ethers and of the commercial water-soluble ethers prepared from alkali cellulose, since the latter contain 1.5 methyl groups. The explanation for this difference is that a more homogeneous product is obtained when cellulose is alkylated in solution.

◆ Problems of Corrosion Analyzed

Members of the New York State Regional Municipal Training Institute were addressed on April 3rd by G. L. Cox, of the development and research division of International Nickel Company Inc., who spoke on metals available to resist the severe corrosion to which sewage disposal equipment is subjected.

Mr. Cox, speaking at New York University, pointed out the trend toward the use of corrosion resistant materials for the vital parts of sewage equipment, where, for mechanical reasons, concrete cannot be used and iron and steel corrode rapidly and where, due to the nature or location of the application, protective coatings are impossible to apply or maintain.

There is sufficient evidence to indicate that high strength, low alloyed steels and irons such as the wrought steels, containing one to five per cent nickel and the nickel-chromium cast irons containing approximately three per cent nickel and one per cent chromium, possess sufficient margin of corrosion resistance to make them useful.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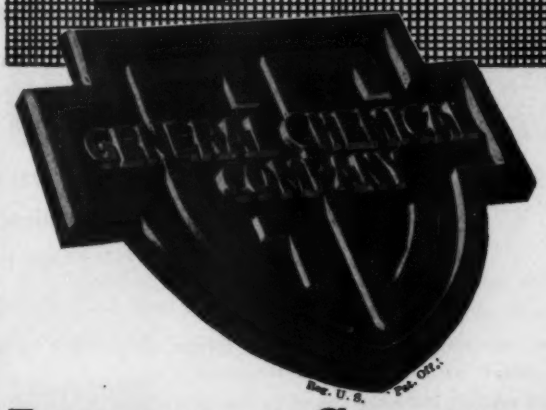

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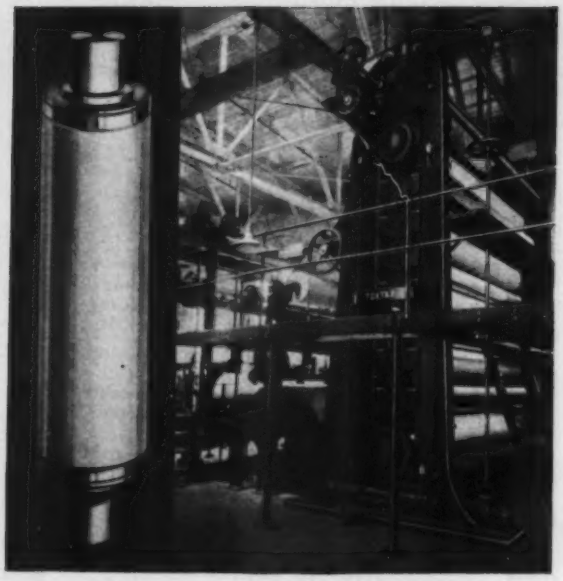

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July 1, 1936 to June 30, 1937

Cum. Scores as of March 31

10 Mills Have Perfect Record

PERFECT SCORE

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A			
GROUP B			
GROUP C			
GROUP D	Southern Extract Co.	Knoxville	Tennessee
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	Rogers Fibre Co., Inc.	Bar Mills	Maine
	The Mead Corporation	Nashville	Tennessee
	International Paper Co.	Riley Mill	Riley, Maine
	Central Fibre Products Co.	Vincennes	Indiana
	Hollingsworth & Whitney Co.	Abenaquis Mill	Madison, Maine
	Central Fibre Products Co.	Mt. Carmel	Illinois

Division II

Container Corp. of America	Anderson	Indiana
Bemis Bros. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P-108	1	6	2.748
	P- 10	2	4	3.264
	P- 28	3	13	3.632
	P-121	4	5	3.846
	P- 27	5	9	4.196
	P- 19	6	7	5.955
	P- 30	7	9	5.978
	P- 13	8	9	6.478
	P- 25	9	6	6.520
	P- 58	10	9	8.489
	P- 12	11	10	8.668
	P- 23	12	10	8.871
	P- 2	13	10	8.891
	P- 18	14	17	9.566
	P- 9	15	22	9.745
	P- 21	16	9	9.759
	P- 11	17	9	9.905
	P- 44	18	15	10.333
	P- 84	19	16	10.377
	P- 69	20	17	12.552
	P- 62	21	21	12.867
	P- 1	22	31	13.344
	P- 64	23	21	13.523
	P- 67	24	30	14.051
	P- 57	25	28	19.094
	P- 73	26	37	19.470
	P-101	27	24	19.909
	P-127	28	27	24.342
	P- 95	29	23	24.446
	P-102	30	39	26.192
	P- 40	31	35	34.353
	P-126	32	92	34.717
	P- 71	33	53	49.073
	P- 32	34	52	51.525
	P- 22	35	8	88.861
GROUP B	P- 60	1	1	1.311
	P- 15	2	1	1.512
	P-119	3	1	1.713
	P- 51	4	2	3.128
	P- 68	5	4	4.915
	P- 72	6	4	5.662
	P- 59	7	4	6.489
	P- 26	8	7	8.374
	P- 3	9	6	8.586
	P-112	10	7	9.017
	P- 70	11	9	11.217
	P- 4	12	8	12.998
	P-107	13	15	17.329
	P-104	14	16	25.572
	P- 16	15	19	26.707
	P-122	16	20	26.932
	P-120	17	21	28.204
	P-128	18	26	32.727
	P- 82	19	25	33.525
	P-124	20	22	36.984
	P- 45	21	43	48.243
	P- 46	22	34	49.430
	P-123	23	43	57.447
GROUP C	P- 97	1	1	1.960
	P- 55	2	2	3.770
	P- 88	3	2	4.135
	P- 89	4	2	4.680
	P- 52	5	2	4.688
	P- 56	6	3	7.420
	P- 37	7	5	11.557
	P- 14	8	4	11.806
	P-103	9	5	14.007
	P- 41	10	6	14.524
	P- 61	11	7	16.231
	P- 43	12	7	19.700
	P- 49	13	7	24.863
	P- 94	14	8	25.313
	P- 20	15	13	27.139
	P- 34	16	9	27.150
	P- 39	17	15	28.928
	P- 50	18	11	34.573
	P- 17	19	15	42.726
	P-111	20	21	49.066
	P- 80	21	14	50.196
	P- 33	22	23	56.945
	P-113	23	26	57.718
	P- 47	24	25	62.173
	P- 48	25	32	65.692
GROUP D	P- 90	9	1	5.656
	P- 93	10	1	6.453
	P-117	11	2	9.203
	P-109	12	2	14.035
	P-116	13	4	14.842
	P- 98	14	3	15.391
	P- 5	15	4	15.611
	P- 86	16	2	15.687
	P- 85	17	1	17.305
	P- 36	18	4	22.223
	P- 91	19	7	25.966
	P- 99	20	4	27.118
	P- 42	21	5	30.867
	P- 6	22	8	31.072
	P-106	23	7	31.314
	P- 53	24	7	37.744
	P-125	25	5	39.461
	P-118	26	7	39.787
	P- 81	27	9	43.731
	P- 65	28	8	56.085
	P-129	29	31	125.305

Division II

	R-10	3	1	2.337
	R-19	4	1	2.846
	R-20	5	3	3.171
	R- 6	6	3	3.396
	R- 2	7	3	4.702
	R-15	8	1	8.130
	R- 3	9	2	10.123
	R- 1	10	5	12.758
	R-21	11	10	14.088
	R-13	12	3	14.539
	R-18	13	4	14.802
	R- 5	14	12	15.720
	R-11	15	3	16.582
	R-14	16	3	37.904

No March report—8 mo. total only: Central Fibre Products Co., Vincennes, Ind.; Central Fibre Products Co., Mt. Carmel, Ill.; Bemis Bros. Bag Co., East Pepperell, Mass.; P-95; P-120; P-124; P-37; P-34; P-36; R-6.

Withdrawn:

P-54, P-63, P-74, P-75, P-76, P-77, P-83, P-92, P-100, P-105, P-115.

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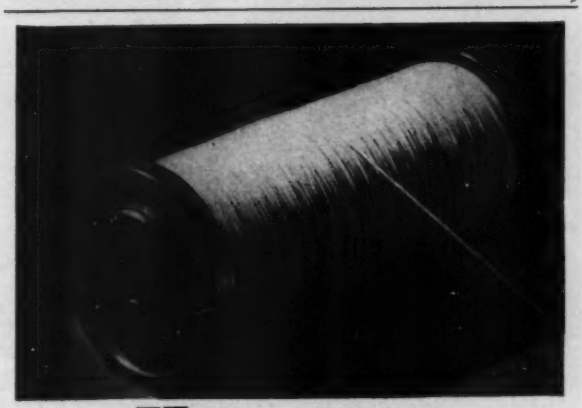

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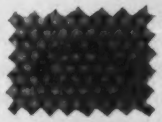

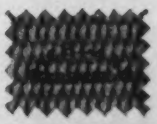

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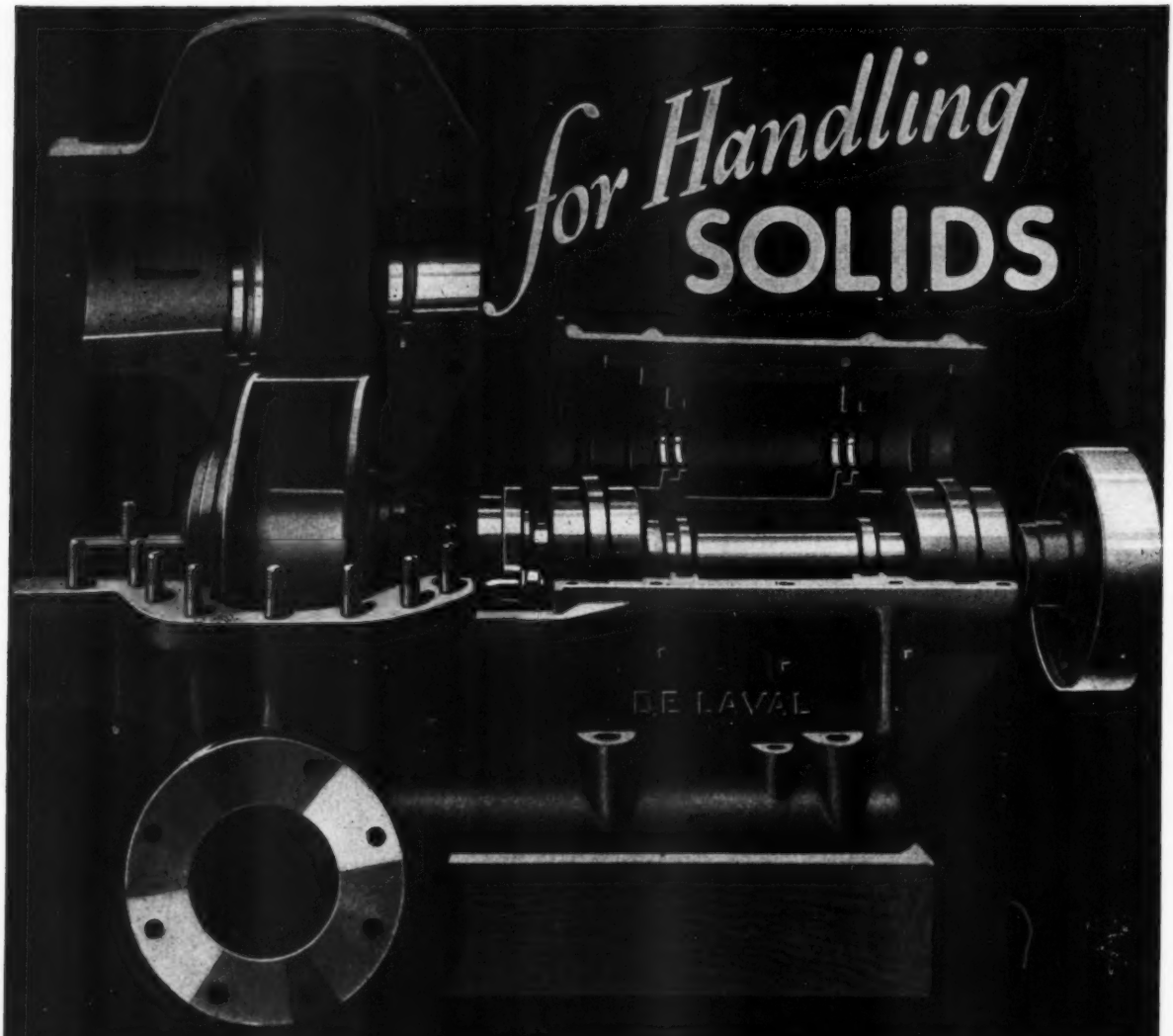

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POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Fusible Plugs

Fusible plugs are safety devices placed in boilers to prevent damage from low water. They are usually placed at the highest point of the heating surface, or at that part of the heating surface which would first be uncovered if the water level was lowered.

In its simplest form a fusible plug consists of a brass or iron plug with a core made of some metal which has a comparatively low melting point. The plug usually has a thread cut on the outside so that it may be screwed into the heating surface of the boiler.

When installed in the boiler, the plug is normally covered with water, which keeps the temperature of the fusible metal below its melting point. Should the water in the boiler fall below the "low water" level, however, the fusible metal is melted by the heat of the furnace and the steam rushes into the furnace thus cooling down the fire.

◆ Periodic Boiler Cleansing

How frequently should a furnace and boiler be thoroughly cleaned by taking it out of service and going over all parts with scrapers, brushes and the steam lance? The frequency of such a cleaning depends on local conditions such as how hard the boiler is being forced, the kind of coal used, type of baffling, gas velocity, etc.

Slag accumulations on the lower tube bank determine the time of cleaning about as closely as any one item. Usually in four or six weeks the boiler needs such a cleaning, even if soot blowing is regular. During the time the boiler is out of service, it is advisable to inspect the tubes to see whether cleaning is necessary. With hard feed water it is necessary to remove the scale frequently.

There is no question about the importance of scale removal, since it is estimated that scale offers a resistance to the transfer of heat 100 times that of iron of equal thickness. To produce equal steaming capacities, tubes with 1/16-in. scale will require about 15 per cent more fuel than clean tubes; with 1/8-in. scale, about 25 per cent more fuel; with 1/4-in., about 40 per cent; and with 1/2-in., about 70 per cent.

While there are many ramifications in the detail of design of mechanical cleaners, they may be divided into two general classes; those which loosen the scale by vibration and those which cut it out The former is applicable to either water-tube or fire-tube boilers, the latter only to the water-tube type.

While the boiler is cooling off, the ashes may be cleaned out of the combustion chamber and back connection. Also, a staging may be erected in front for work on headers and tubes and the tube cleaners, hose, and pump or compressor prepared for work. As soon as the boiler is emptied, the front caps may be removed, manholes opened and drums washed out. Several men equipped with chisels, scaling hammers, etc., may enter the drums and begin the work of removing scale. As soon as caps are off, the tube cleaner should be started. Caps, nuts, bolts and binders should also be cleaned. Headers should be cleaned by chipping the scale deposits off with chisels and scaling hammers. The entire boiler should then be thoroughly washed out.

External surfaces of the tubes, headers and drums should also be cleaned. As a rule, the tubes must be scraped to clean off the slag accumulations, after which a thorough blowing with a steam or air lance will remove the balance of the accumulations. Another method used in some plants is to wash off the tubes, after scraping, with water from a hose. Care should be taken to use no water until the setting is cool and it is better to use the hose while the tubes are full of water, as there is less danger of causing undue contraction.

Baffles and the combustion chamber should also be thoroughly cleaned. Sometimes the baffle walls are scraped, in which case care should be used not to up-end any of the baffle tile when the wall is of that type of construction.

◆ Over-all Efficiency

In the operation of power plant equipment, small variations in the efficiency of any particular unit are often unnoticeable and it may not be thought worth the extra effort necessary to maintain a unit at its topmost efficiency. It must be remembered, however, that the over-all efficiency of a plant is dependent upon the individual efficiencies of its component units and that a loss of two per cent here and two per cent there may soon total up to a loss of 10 or 15 per cent. It follows, therefore, that if we can effect a saving at any one point and another, at another point, the sum total of these savings, even though they might be slight in themselves, will increase the efficiency of our plant, say, 15 per cent.

In considering efficiency, we must consider the plant as a whole. It matters little whether our boiler efficiency is 65 or 75 per cent, if we waste 20 per cent of the available energy in the steam in inefficient steam using apparatus. If, on the other hand, our engines, pumps, turbines, etc., are all operating at their maximum efficiency and making the best use of the available steam, it will be well worth while to pay attention to the boiler efficiency.

Power plant losses are generally hidden away in small parcels and for this reason it is easy to overlook them. Every one will agree that no engineer or plant owner would tolerate a piece of equipment in the plant the efficiency of which ran 15 to 25 per cent below the possible efficiency. Such apparent losses, if they did exist, could not continue very long without having somebody notice them. So in most plants, the efficiency of any particular piece of equipment is pretty certain to be somewhere near its possible efficiency.

Now while these trifling losses may not amount to much, where the individual piece of equipment is concerned, all these trifling losses added together serve to decrease the over-all efficiency to a considerable extent. It is imperative, therefore, that these small unnecessary losses be eliminated.

In presenting arguments to the management for improved equipment or instruments, which in themselves may not make a spectacular showing, the engineer will do well to keep this point of over-all economy in mind. It may serve to clinch his argument.

◆ Locating Field Shorts

To determine the location of a "short" in the field coil of a motor or generator the best method is to use a voltmeter and measure the drop across each coil. If one coil is defective the drop across the defective coil will be less than that across the others. If none of the coils are shortened or otherwise defective, the drop across each coil will be equal to the line voltage divided by the number of field coils, that is, if they are connected in series. If a voltmeter is not available a lamp may be used, although this is not quite satisfactory. When the lamp is used the defective coil will be indicated by the decreased brightness.

Another method of locating shorts in field coils is to connect the field circuit directly across a line of normal voltage. The current is allowed to remain on for about 20 minutes, after which any defective coils may be noted by their different temperatures.

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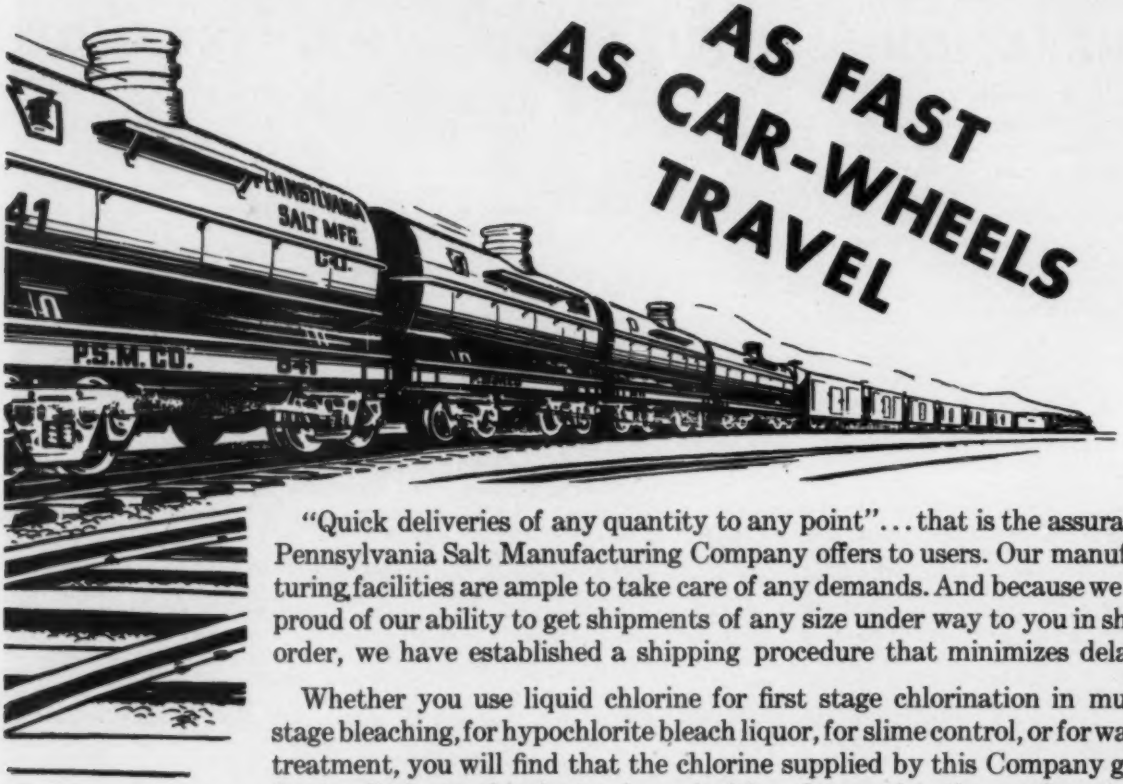

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TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

IN THE PAPER INDUSTRY

◆ Fourdrinier Wire

A research chemist and metallurgist has written a comprehensive article on the technical phases in the manufacture of the wire. Phosphor-bronze still holds the field in fourdrinier wire manufacture despite the fact that other and possibly much more efficient alloys have been devised. The lag of industry behind research is due to the difficulty in testing new alloys in the laboratory under conditions that approximate those in the mills and in separating those factors that lead to the disintegration of the fourdrinier wire. Furthermore, the cost of using experimental wires made of new alloys is often prohibitive in making experimental mill runs and prior to their use even entail modifications in the entire weaving process. Often the alloys of higher tenacity than phosphor bronze do not have the high ductility required.

Other factors explaining the persistence of phosphor bronze are also discussed in detail. The formation of the wire now used is clearly outlined. The tin in the copper alloy, which in England does not exceed 7 per cent but which may be higher when Continental practice is used, should always be in solid solution after the alloy has cooled. Solidification occurs at about 900 deg. C. or at even lower temperatures when more tin is employed. Theoretically as much as 16 per cent tin can be held in the solid copper-tin solution, but only if the conditions of alloy formation are greatly modified. This is especially true of the time required for the proper redistribution of the tin. It is possible for the tin to remain in solution at the point of solidification and still to separate out at the further cooling of the alloy. This can be shown microscopically. The so-called Delta tin-copper compound is then formed. This has the composition Cu_4Sn, is very brittle, definitely modifies the ductility of the alloy, and its formation must therefore be avoided. In medium tin-copper alloys, the proper distribution of tin in solution is reached by working the alloy during the annealing process, thus reaching equilibrium more rapidly and avoiding tin segregation. Tin up to 10 per cent is the maximum that is even suitable for wire formation, but this is already a dangerously high tin content. Hence in practice (on the Continent) 8.5 per cent tin is usually the upper limit. When brass wires are still used, the zinc content seldom exceeds 20 per cent.

The importance of keeping solid solutions in any alloy that is used in wire formation is paramount. Brittleness is the usual result from the formation of compounds or separate constituents, unless these are formed under very carefully controlled conditions and in very small amounts. The soft S. W. G. wire received in the wire-weaving plant shows the structure in the photomicrograph of Fig. 1. In grains of fairly uniform size this is the so-called alpha solution of tin in copper. The author discusses the structure of these crystals very completely. Any irregularities in tin distribution must be removed previously by working and annealing. The common sizes to which the 20 S. W. G. wire are drawn usually vary between 32 and 36 S. W. G. The type of die (often a diamond die) here used and its care and treatment are fully described. The speed of wire drawing (1500-3000 feet per minute) requires careful lubrication, separate jets of lubricants being used on the inlet to each die. The lubricant is then allowed to settle and is pumped automatically through a filter. If the wires are drawn too thin without annealing the so-called cuppy results and this state entails a partial fracture in the core of the wire, rendering it useless.

Other difficulties and wire failures are pointed out clearly. In the drawing machines the wire should always approach the die at right angles. The structure of the alloy changes markedly during the drawing operation. Hardness and brittleness result and the tensile strength increases from 26 to 55-60 tons per square inch, with an elongation of 1-2 per cent. The first signs of the structural changes referred to are the so-called slip lines, shown in the photomicrograph in Fig. 2. Further drawing causes the original crystals to be converted into crystallites of a minimum size. Excessive drawing, however, leads to distortion of the crystal lattice with a breaking down stage shown in Fig. 3. In the case of all warp wires at least, it is best to anneal in an electric tube furnace, the temperature of which is carefully controlled, and through which the wires are drawn at speeds depending on their cross section. The weft wire may be pot-annealed but here, too, the electric tube furnace has proved very satisfactory. While the surface of the warp wire must be smooth, the weft wires may have slightly etched surfaces since they do not make direct contact with the paper.

The theory of annealing is discussed in great detail. It is essential that the core of the wire does not contain a few comparatively large crystals which give it weakened properties. This may result in wire that has been poorly worked or annealed. Figure 4 is a photomicrograph of a poor wire of this type, while Fig. 5 shows the correct structure of a wire used in weaving. The annealing temperatures, and the speed with which wire is passed through the furnace are of marked importance. The heat must permeate the entire wire to prevent the maldistribution of the tin. The construction and the use of annealing furnaces is fully reviewed as is the wire weaving process which requires exceedingly heavy looms, with very powerful shuttles, throwing arms and cams. The correct technique in wire weaving and the difficulties that have to be overcome to insure success also are carefully pointed out. Brass wire weaving is very briefly alluded to. The entire article is worthy of the attention of the papermaker, since it presents the objective findings of a very experienced metallurgist, familiar with the problems of papermaking. H. H. Parrett. Papermaker and British Paper Trade J. (T. S.) 92,165-7; 180-2 (1936); 93 (T. S.) 1-2; 20-1 (1937).

◆ Chlorination of Plant Tissues

After reviewing critically 22 references in the literature, the investigators studied the chlorine consumption in the delignification of spruce, beech, straw and flax. Shown in the illustration is the highly simplified technique in chlorination. Samples, previously moistened and heated with water, were placed in bottle III and the HCl generated in the reaction was trapped in the adjacent three-bulb absorption tube. Bottles I and II

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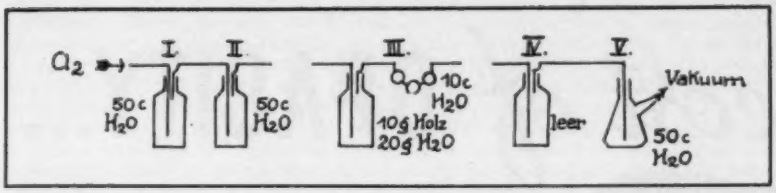


each contain 50 cc. of water. Bottle IV is empty and suction flask V contains 50 cc. of water. Details are given for determining the approximate amounts of the total chlorine consumed, the total chlorine in the wash waters, the HCl generated, the organically bound chlorine in the wash waters, the total organic matter and the total organically bound chlorine. Cellulose, alpha-cellulose and copper numbers were also determined, as were the effects of two different periods of chlorination. After 60 and 144 hours respectively, moist spruce consumed 62.1 and 76.7 per cent chlorine. After 48 and 144 hours respectively, moist beech consumed 64.6 and 78.4 per cent, straw took up 48.5 and 59.2 per cent, and flax required 14.3 and 20.5 per cent chlorine. Both HCl liberation and Cl consumption were higher than would be assumed from a study of the literature. The mechanism in all cases is probably very similar. It involves substitution of hydrogen by chlorine (with the liberation of HCl) as well as oxidation. O. A. Müller and F. Stalder. Papier-Fabr. (Tech. Teil) 35, 8-14 (1937).

◆ Impregnating Materials in Pasteboard

After a thorough discussion of the use of paraffin with the disadvantages of employing volatile hydrocarbons as solvents, and the advantages of using some of the more recent emulsifying agents (like the ethanolamines and their derivatives) or even small amounts of other alkaline solutions, the author takes up some of the later developments in impregnation. For example, when rubber latex is used paraffin does not mix satisfactorily with the former, which is alkaline, and the natural waxes serve better in latex admixtures. Cellulose acetates may also be used as impregnating agents. Their water resistance appears to be correlated with their acetyl content; the higher acetates being the more resistant. Chlorinated rubber is also employed, since these compounds are highly resistant against water, oil, acids, alkalies, and chemicals in general. Provided these are used in a volatile hydrocarbon solution, the board should be thoroughly dry. Chlorinated rubber may also be emulsified with water-soluble emulsifying agents.

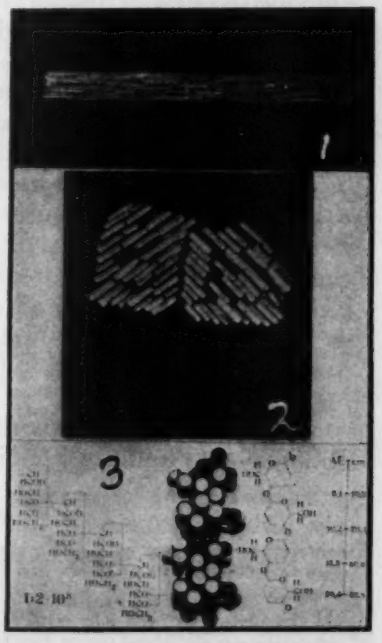
When using water glass for impregnating board, the alkali content should be at a minimum. Reference is made to German Patent 522,634 in which alkali silicates are treated with glycerine containing weak organic acids like lactic acid, which react with the base in the water glass forming sodium lactate and thus serving to cut down the deleterious action of the alkali. Careful distinction should also be made between sodium and potassium water glass solutions. The former are much more subject to efflorescent carbonate formation from the CO_2 of the air and these flocks or crystals may appreciably weaken the protective action of the water glass. An entire series of patents has proposed to correct this disadvantage, but the claims are simply panaceas, not correctives. Potash water glass is more resistant than that formed from soda. It decomposes less readily in the board, and the so-called Ausbluhung (efflorescence due to carbonate formation) does not appear. All-in-all, potassium water glass offers some marked advantages. It is cheaper than paraffin (in Germany) or cellulose acetate, and has high protective qualities. The most recent developments in the board impregnating field, however, include the organic silicates. Those which are most practical are the methyl and ethyl derivatives. The latter has the formula: $Si(OC_2H_5)_4$. These organic silicates yield coatings similar to but far more elastic than the water glasses. They have the advantage of hydrolyzing gradually to alcohol and silicic acid and do not form alkali in the board. Ethyl silicate has been known for well over sixty years and was proposed as a preservative, but owing to its slow rate of hydrolysis at ordinary temperature, and to its high insolubility in water, it was not used. Now, however, by mixing 300 parts (by volume) of ethyl silicate with 5.6 parts of water and 175 parts of denatured alcohol, it is possible to obtain a solution that may be used for impregnation and which maintains its stability for months. It is also possible to obtain partially hydrolyzed alcoholic solutions of the ethyl silicate, that can be stabilized. These are covered in German Patents 512,716 and 568,545, which also include the synthesis of organic silicates from silicon tetrachloride and alcohol. Fritz Ohl. Wochbl. Papierfabr. 68, No. 9 (Tech Teil) 156-8 (1937).

◆ Parchmentizable Pulps

Evidently pulps that are very high in alpha-cellulose, and which show but a slight coloration with ruthenium red (ammoniacal ruthenium oxychloride) are not readily subject to parchmentization when they are beaten. When, however, an appreciable proportion of the fibers are stained red and pink by this reagent, parchmentization on beating takes place very readily. This then, seems to be an excellent way of correlating a staining reaction with the possibility of forming vegetable parchment. The author, however, (unfortunately) still refers to the calcium pectinate of the middle lamella in woods, and assumes that pectin is admixed with cellulose in the secondary layer of the cell wall. Most chemists have discarded this nomenclature. A number of beating experiments are described. In general it was found advisable in carrying out a sulphite digestion to use about 3.8 per cent (total?) sulphur dioxide, 1.1 per cent lime, temperatures below 130 deg. C and pressures below 5 atmospheres. The author's theory is that the so-called pectin containing layers of wood are not to be too greatly altered or disturbed in the cooking process, and that the parchmentizing properties of the resulting pulps are therefore better. The best vegetable parchments were obtained with products pulped to a Roschier number of 25-28. [This would correspond to a Sieber number of about 57-51, or to a Johnsen permanganate number of about 14-13 (Abstractor)]. Otto Wurz. Papier-Fabr. 35 (Tech. Teil) 54-60 (1937).

◆ From Atom to the Visible Fiber

As the result of much experimental work, the author has developed a theory for the structure of cellulose crystallites, fibrillae, and fibers, and the relationship between lignin, the hemicelluloses, and cellulose. He has constructed models in which each Ångström unit in the fine structure of cellulose has been built on a scale of 2×10^8 such units, and some of these have already been illustrated in



some of the scientific journals. Cellulose fibrillae fit into the honeycomb structure of the lignin of the cell wall (not the middle lamella) which is thus comparable to reinforced concrete, with lignin and possibly some of the non-cellulosic polysaccharides acting as the cement or matrix for the cellulose. The openings in the lignin seem to lie below the visibility obtained by the microscope, but

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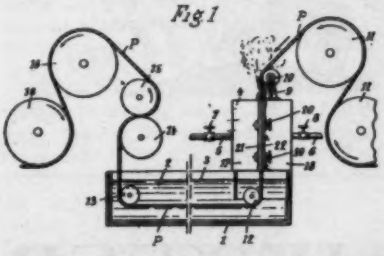
above that shown by using the X-ray technique. These openings are of the same order of magnitude as are the cross sections of the cellulose fibrils; i.e., approximately 600 Ångström units. The crystallites in these fibrillae have cross sections of about 60 Ångström units. The cellulose molecules that make up these crystallites, although only a few Å units in width are assumed to be much longer than the crystallites themselves and, according to the author, may extend through several successive crystallites, at different levels in each one (since the threadlike cellulose molecules are presumably highly flexible). In other words the crystallite bundles are not separate and discontinuous from each other nor is their length dependent on that of the cellulose molecule, which may be as much as 5000 Å while the crystallite of which they form a part may be only 600 Å.

Such a concept assumes that certain of the thread-like cellulose molecules begin, that others run through, and that still others end in a given crystallite. Fig. I shows the author's visualization of a fibril of cellulose, made up of crystallites. Fig. II indicates the concept of two neighboring crystallites in cross section showing also the schematic sections of the cellulose molecules. Fig. III gives schematically, the generally accepted theory of the structure of a portion of the cellulose molecule containing four anhydroglucose residues. Lignin cannot be chemically combined with cellulose, and at best any cellulose-hemicellulose combination can only be on the surface. It is quite possible that the fibrils besides containing the orientated cellulose molecules in the crystallites also contain amorphous polysaccharides. Karl Freudenberg. Papier-Fabr. 35 (Tech. Teil) 49-52 (1937).

◆ Sizing of Photographic Paper

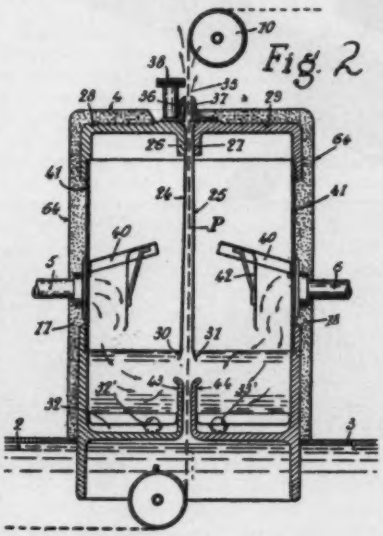
In Figure 1, the sizing equipment consists of a tank (1) which contains the size solution (2), that is raised to the desired level (3). A steam chest (4) is erected on one side of (1), and in this there is an exhaust which functions in conjunction with the steam supply which enters (4) through the pipe lines (5)

Fig 1



and (6), and which is regulated by using the valves (7) and (8). The support (9) above the steam chest (4) holds the small roll (10) over which the paper sheet (P) passes, after coming directly from the dryers (11). Guide roll (12) is right underneath the steam chest, and (P) passes over this and over a second roll (13) at the other extreme end of the size bath. Above (13) are the drying cylinders (14) and (15) made of stone or rubber according to usual practice, which serve to squeeze out the excess of the size solution. Thence (P) travels over a series of dryers (16). A high speed is maintained throughout; in fact the speed of sizing is synchronized with that of the paper machine, and depends entirely on the rate at which (P) leaves the machine. The details of the steam chest are important and are fully described in the patent. These are shown

Fig. 2



in Figure 2. Here (5) and (6) are the entering steam lines, and (40) are the supports holding the baffles (42) which are so constructed that they insure the downward distribution of steam. The chest contains two central partitions (24) and (25) between which (P) passes and the ends of which (30) and (31) terminate some distance above the bottom (32) and (33) of the chest, which is placed just above the level (3) of the size bath. The concentration of the latter is inappreciably affected by the moisture condensed on the paper. The patent claims that the paper may be sized throughout the sheet, that air can be almost completely expelled from the sheet prior to sizing and that consequently atmospheric pressure permits the penetration of the size, and that one of the features is that the suction within the steam chest directly precedes the sizing operation. Kodak-Pathé. French Patent No. 803,728.

◆ Water in Its Relation to Sizing Difficulties

Whenever paper mills experience sudden troubles in sizing, the difficulties can often be traced to variations in the process water rather than to the rosin or other materials in the size. While new rosin shipments should be regularly tested, it has been found that when water from rivers or lakes (that are readily disturbed by local weather conditions) is used as process water, this often accounts for the trouble. Paul Hermann. Wochbl. Papierfabr. 68, No. 5,80-1 (1937).

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In far too many plants, pipe is pipe, just as "pigs is pigs"—in other words, pipe signifies traditional, heavy-walled, wrought-steel pipe. In the installation illustrated above, for instance, heavy pipe would undoubtedly have been used in many mills, and as a matter of fact it probably would have been satisfactory from a service standpoint, but—

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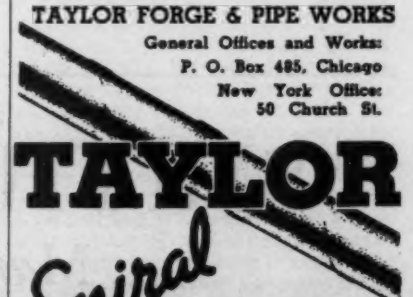

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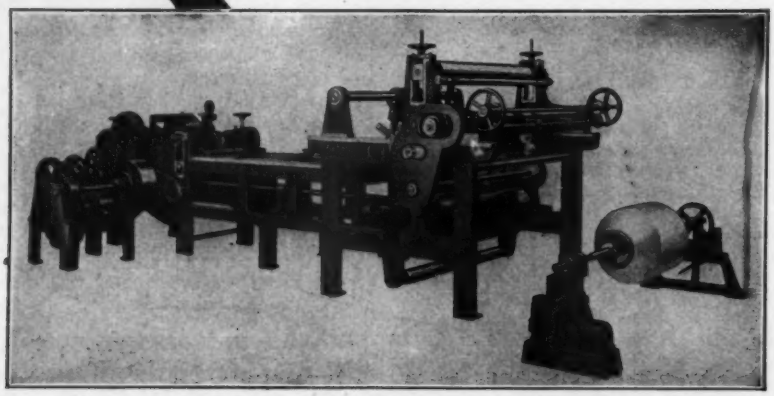

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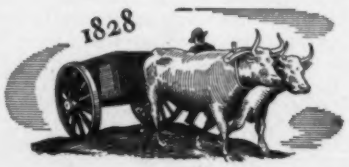

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Compiled by James Atkins, Registered Patent Attorney

20,266—Method and Apparatus for the Digestion of Fibrous Material. Thomas Leonidas Dunbar and Albert Darius Merrill, Watertown, N. Y. Original No. 1,918,459, dated July 18, 1933, Serial No. 576,254, November 20, 1931. Application for reissue January 29, 1935, Serial No. 3,984. 39 Claims. (Cl. 92—7.) In the digestion of fibrous material by the sulphite process, progressively raising the temperature of acid liquor as the pressure thereon progressively increases during its passage from the weak acid tower to the digester and utilizing the heated liquor for the digestion of fibrous material.

20,267—Digesting Process and Apparatus. Thomas Leonidas Dunbar and Albert Darius Merrill, Watertown, N. Y. Original No. 1,888,632, dated November 22, 1932, Serial No. 528,696, April 8, 1931. Application for reissue November 21, 1934, Serial No. 754,194. 49 Claims. (Cl. 92—11.) In a process of the character described, preparing a preheated high acid content cooking liquor, introducing this liquor into a digester containing fibrous material, and pumping such liquor into the digester until the pressue in the latter rises to at least 50 pounds.

20,271—Fibrous Sheet Material. Stephen B. Neiley, Winchester, Mass., assignor to Dewey and Almy Chemical Company, North Cambridge, Mass., a corporation of Massachusetts. No Drawing. Original No. 1,978,385, dated October 23, 1934. Serial No. 668,663, April 29, 1933. Application for reissue December 21, 1934, Serial No. 758,650. 13 Claims. (Cl. 92—21.) A highly absorptive flexible water-laid felt comprising long fibers hydrated sufficiently to produce a self-sustaining web both in wet and dry condition and short substantially individualized unhydrated liberated fibers in amount to form an absorptive springy felt capable of receiving an impregnant.

2,067,501 — Parchment Paper and Method of Making Same. John A. Newman, Edgeley, Pa., assignor to Paterson Parchment Paper Company, Bristol, Pa., a corporation of New Jersey. No Drawing. Application July 7, 1934, Serial No. 734,201. 11 Claims. (Cl. 91—68.) A vegetable parchment paper having relatively light parchmentized exterior surfaces and a fibrous interior section substantially unparchmentized, porous with respect to the entry into the interior thereof of extraneously applied wax, the fibrous interior section being impregnated with a wax, the finished product forming a dry-waxed parchmentized paper at least one surface of which is capable of receiving and retaining printer's ink.

2,067,755—Tension Controlling Means. Herbert L. Dyer, Jr., Erie, Pa., assignor to Hammermill Paper Company, Erie, Pa., a corporation of Pennsylvania. Application July 26, 1933, Serial No. 682,173. 8 Claims. (Cl. 34—48.) In combination, a pair of drying cylinders adapted to have a web of flexible material passed thereover and to rotate in opposite directions during the travel of said material, means responsive to variation in the drying action of said cylinders for changing the area of contact between said web and said cylinders to compensate for said variation, said means comprising elements spaced from each other in the direction of travel of said web and engaging opposite sides of the latter between said cylinders, and means constantly urging said elements to rotate about an axis spaced from the longitudinal axes of said elements and in such direction as to exert forces against the sides of said web. In combination, a pair of drying cylinders adapted to rotate in opposite directions and to have passed thereover a web of flexible material variable as to length under the drying action of said cylinders, means engageable with said web and responsive to a tendency of the web to change in length for automatically causing said web to bear with such pressure and over such area upon said cylinders as to maintain the tension in said web constant despite variations in the internal characteristics of said web under the drying action of said cylinders, said means comprising elements bearing against said web at points between said cylinders and means causing said elements to exert pressure against opposite sides of said web.

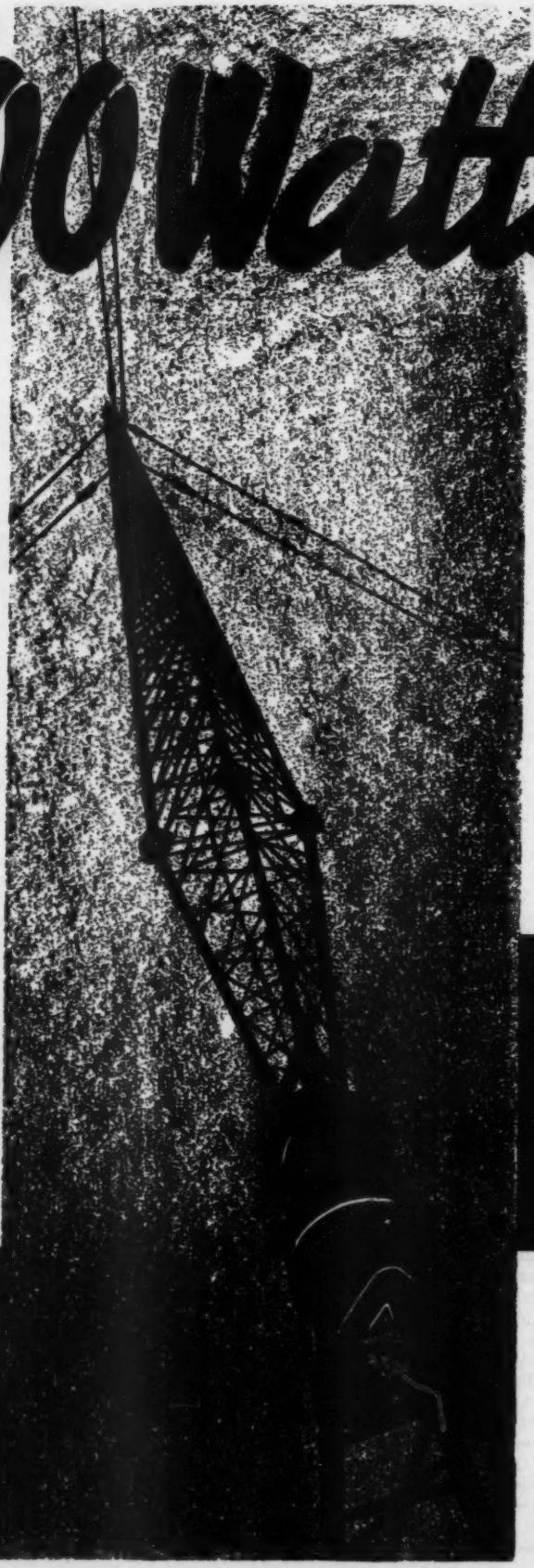
2,067,876 — Method of Incorporating Special Materials with Paper Stock. Wilbert L. Campbell, Denver, Colo., assignor to United States Gypsum Company, Chicago, Ill., a corporation of Illinois. Application July 12, 1934, Serial No. 734,751. 2 Claims. (Cl. 92—21.) The process of making paper on a papermaking machine in which white-water is recirculated, which comprises, feeding a suspension of paper-stock to the forming wire to form a web thereon, collecting the white-water passing through said wire and immediately feeding a filler thereto prior to its recirculation to form an advancing stream of filler-containing water, forming an advancing stream of a suspension of paper-stock, combining and mixing said streams and causing the resulting mixed stream to be fed to the forming wire to form a web of filler-containing paper thereon.

2,068,151 — Paper Manufacture. Raymond F. Remler, Lakewood, Ohio, assignor, by mesne assignments, to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware. No Drawing. Application November 5, 1934, Serial No. 751,583. 5 Claims. (Cl. 92—13.) In a process of cooking a fibrous material, the step comprising subjecting the material to the action of an alkaline medium and a minor amount of turpentine.

2,068,155—Machine for Making Corrugated Paperboard. George W. Swift, Jr., Bordentown, N. J., assignor to George W. Swift, Jr., Inc., Bordentown, N. J., a corporation of New Jersey. Application May 12, 1934, Serial No. 725,252. 6 Claims. (Cl. 154—30.) Apparatus for making corrugated board comprising in combination a pair of intermeshing corrugated rolls, one constituting a carrier roll and having in its periphery an endless circumferential groove of substantially greater depth than its corrugations, means for delivering paper to said carrier roll at the intermeshed portions of the two rolls, means for removing corrugated paper from the carrier roll at a point substantially removed from the intermeshed portions of said rolls, whereby the paper covers a portion of said groove between the points of delivery and removal of the paper, forming a covered chamber; and air-excluding means projecting into both ends of said chamber so as to maintain a continuous sealing relation with the corrugated paper, terminating therein beneath the corrugated paper on the carrier roll and out of the path of the paper as it engages and as it leaves the carrier roll, said air-excluding means having at least one duct therein for the extraction of air from said chamber.

2,068,504 — Paper Cutting Machine. Augustus Misch, Bronx, N. Y. Application June 15, 1932, Serial No. 617,272. 16 Claims. (Cl. 164—54.) A cutting machine of the guillotine type for cutting paper, leather, textile fabrics, rubber and the like, comprising a cutter carried by a knife bar, an automatic paper clamping device operated by a pressure producing unit, a means to impart to said knife bar a vertical and oblique movement, a back plate and a sledge, the oblique movement of the knife bar imparting to said sledge a combined vertical and horizontal movement causing it to slide along the back plate and imparting to the latter a vertical movement, and said pressure unit

500,000 Watts



Through the use of tremendous power, radio station W L W is known far and wide.

Another "500,000 watt" organization is that of Black-Clawson and Shartle.

Among their recent major contributions to paper making are supercylinder machines, Tugboat Annies, Barnacle Bills, and rotobeaters.

BLACK-CLAWSON and SHARTLE BROS.

lying between a portion of said knife bar and a portion of said sledge which overlies said clamping device, and a scale operated by said pressure unit to indicate the pressure in tons during each operation of the cutting period.

2,069,063—Method of Finishing Composite Paper Sheet Material. George E. Gibbs, Attleboro, Mass., assignor to American Reenforced Paper Company, Attleboro, Mass., a corporation of Massachusetts. Application January 4, 1935, Serial No. 353. 4 Claims. (Cl. 154—2.) The method of finishing composite sheet material where layers have been secured together face to face by hot asphaltum which has the tendency to eliminate the moisture of the composite sheet material, applying to one of the paper layers only a liquid to return to that layer the moisture that was expelled therefrom by the heated thermoplastic, and winding the composite paper sheet into a roll with a moistened surface of the paper layer facing outwardly so that the unmoistened paper layer of the next wind shall contact with the moistened layer of the previous wind and transmit to the unmoistened layer the normal moisture that was expelled by the heated asphalt.

2,069,257 — Process of and Apparatus for Manufacturing Artificial Leather or the Like. Ernst Mahler, Neenah, and John B. Catlin, Appleton, Wis., assignors to Paper Patents Company, Neenah, Wis., a corporation of Wisconsin. Application July 5, 1934, Serial No. 733,936. 8 Claims. (Cl. 154—40.) A process of fabricating a product of the character described, which consists in continuously moving a bat of creped tissue wadding through a compression zone, saturating said bat with a filling and binding liquid before it passes through said zone, continuously moving the wet bat through one or more additional compression zones, moving dry bats of similar material into contact with both sides of the wet bat at each said additional zone or zones and compressing them onto said wet bat, saturating said dry bats with a filling and binding liquid before they pass through said additional zone or zones, and then drying the resultant article.

2,069,766—Paper Manufacture. Thomas R. Le Compte, Pittsburgh, Pa., assignor to John A. Manning Paper Company, Inc., Green Island, N. Y., a corporation of New York. No Drawing. Application March 7, 1934, Serial No. 714,457. 19 Claims. (Cl. 92—21.) Method of making paper, characterized by adding to a fiber-mix before the formation of a paper web therefrom, of a water-dispersible water-imbibing polar-molecule derivative of a water-imbibing non-polar-molecule gum.

2,069,771 — Manufacture of Felted Proofed Fibrous Materials. Truman A. Pascoe and Roy P. Hella, Cloquet, Minn., assignors to Cellovis, Inc., Wilmington, Del., a corporation of Delaware. Application September 1, 1932, Serial No. 631,410. 21 Claims. (Cl. 92—21.) The method of making a paper-like sheet which comprises hydrating cellulose, felting into sheet form a paper-forming stock of said hydrated cellulose and fibrous material and a finely divided cellulose derivative, and drying said sheet.

2,069,786—Coated Paper. Peter A. van der Meulen, New Brunswick, N. J., assignor to John R. Ditmars, New Brunswick, N. J. No Drawing. Application July 18, 1933. Serial No. 680,974. 14 Claims. (Cl. 91—68.) A decorative coated sheet material including a base and a coating on the surface of the base in the form of a smooth, continuous, surface-hardened, flexible film having a highly polished surface and containing a film forming composition and a water-insoluble salt of a metal other than a metal of the first group of the periodic system in a fine state of dispersion throughout the composition .

2,072,670 — Reducing Dusting in the Manufacture of Coated Paper. Louis C. Fleck, Appleton, Wis., assignor, by mesne assignments, to K. C. M. Company, Dayton, Ohio, a corporation of Delaware. No Drawing. Application June 29, 1934, Serial No. 732,994. 10 Claims. (Cl. 92—40.) The process of preparing a substantially non-"dusting" paper, as part of a continuous paper making operation, which comprises applying to a heated, partially dried web a coating composition containing an adhesive liquid fraction and an insoluble solid fraction, the coating composition at the point of application being maintained at a temperature sufficiently low, and at a viscosity sufficiently high, to prevent separation of the liquid fraction from the solid fraction during the coating operation.

2,073,894—Panel Board and Method of Making Same. Frederick P. Wood, Adrian, Mich., assignor to Simplex Paper Corporation, Adrian, Mich., a corporation of Michigan. Application January 30, 1936, Serial No. 61,505. 13 Claims. (Cl. 154—2.) A product in sheet form which is highly resistant to physical change in a wide range of temperature and humidity conditions, comprising a sheet of sized fibre pulp consisting of a singly formed layer of fibres of nearly pure cellulose disposed substantialy uniformly in all directions, said sheet being partially impregnated with asphalt having a melting point of not less than 140° F. and a penetration point of not over 22, the surface fibres of the sheet extending beyond the body of asphalt, whereby said sheet may be cemented to an adjacent surface. The method of making a product in sheet form which is highly resistant to physical change in a wide range of temperature and humidity conditions which comprises impregnating a sheet of sized fibre pulp with molten asphalt, then simultaneously compressing the fibres of the sheet and removing the excess asphalt therefrom, then allowing the fibres of the sheet to expand for a predetermined period of time to draw the surface layers of asphalt into the body of the sheet and cooling the sheet.

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There's only one light weight pipe on the market that gives you the extra benefits of the Lockseam Spiralweld.

This structure of Naylor Pipe—long known to paper mill engineers—is the factor that distinguishes it from all other light weight pipe, not only in appearance, but primarily in performance.

The Lockseam Spiralweld structure gives you four unrivaled extra benefits:

1. **It provides greater structural strength than any other pipe made of steel or iron of the same wall thickness.**
2. **It offers unrivaled flexibility to take care of expansion and contraction.**
3. **It provides an exclusive Safety Feature which acts as a continuous expansion joint, absorbing shock loads and protecting the body of the pipe and the coupling medium from stresses and strains.**
4. **It offers greater stamina because the Lockseam carries the load, relieving the weld which serves only to seal the pipe leak-tight.**

When you install light weight pipe, make sure that you're getting these EXTRA benefits of Lockseam Spiralweld construction. Specify Naylor Lockseam Spiralweld Pipe.

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Backed by nearly half a century's experience in felt making, Appleton Felts are designed with technical foresight as quality felts and manufactured under a plant control to assure that quality. That's why *Appleton Felts make good paper.*

APPLETON WOOLEN MILLS

Appleton *Wisconsin*

The COMMERCIAL OUTLOOK

New York, May 1, 1937.

ALTHOUGH at present a slowing down of general business is clearly perceptible, due to a retrenching movement among buyers, recent developments at Washington breeding uncertainty and seasonal circumstances, the influence has not yet been felt within the paper industry. Paper and board mills are exceedingly busy. Most of them are running six, and even seven, days a week, and it is an open secret that many are well behind in deliveries. Try as strenuously as they have over the last few months, they have not been able to catch up with orders, and in numerous instances manufacturers are doing what they can to actually ward off additional business, confining the acceptance of commitments exclusively to regular customers.

It would seem that even should the prevailing lull in general business assume wider dimensions as the summer draws on, and should there be some cancellations of paper orders as well as a further contraction of paper buying, activity among paper mills is hardly likely to be greatly affected for a time. The reason for this is that paper manufacturers are so heavily booked on orders for their product it will require some time for them to catch up, even if they continue to operate their plants at full or near to full capacity. Moreover, there is common belief within the industry that a large volume of additional orders is waiting to be placed, and that should the favorable opportunity be afforded, jobbers, converters and consumers would quickly seek to file commitments for the supplies desired.

Many in the trade feel it is likely the industry will pass through the summer period without experiencing the customary seasonal lapse in manufacturing activity. It is probable, of course, buying will quiet down to some degree, but it is believed the large backlog of orders which has been accumulated will necessitate mills operating on a maximum scale right through the hot weather months and until the usual market stimulation occurs in the autumn.

Virtually every print paper producer in the United States and Canada has climbed on the bandwagon and announced a $50 per ton contract price for standard newsprint for the first half of 1938 following the lead inaugurated by the International Paper Company in March. The spot market position of newsprint is very firm. Already a $60 a ton basis prevails for current deliveries from domestic or Canadian mills, and it is reported that European newsprint also is bringing this price for spot shipments.

The general index of advertising for March showed a gain of 2.4 per cent over the preceding month and a rise of 11.4 per cent over March, 1936, according to Printers' Ink. The first quarter of 1937 recorded an increase of 11.3 per cent over the same period in 1936, all of the component media showing gains. The gain for the first quarter of 1936 over 1935 was but 6.4 per cent. Newspaper advertising in March was 2 per cent over February this year and 10.6 per cent above March last year.

All-time highs for newsprint production in North America were set in March, surpassing the previous records established in October last year, according to the News Print Service Bureau. Canadian output showed a gain of 23.5 per cent to 301,110 tons over 243,900 tons in March a year ago, and was slightly above the high of 301,106 tons in October, 1936. United States production showed a small increase to 82,576 tons in March to put the total for both countries at 383,686 tons, compared with 320,407 tons in March a year ago, a rise of 63,279 tons or 19.7 per cent. The previous high for both countries was 382,133 tons in October last.

For the first three months of 1937 North American mills produced a total of 1,185,870 tons of newsprint, against 996,034 tons in the similar period of 1936, an increase of 189,836 tons or 19.1 per cent. Shipments by Canadian mills were 290,453 tons and by United States mills 79,570 tons in March, so that stocks at mills increased to 84,902 tons in Canada and 19,001 tons in the U. S. The total stock at mills in both countries was 103,903 tons at the end of March, compared with 90,240 tons a month before and 114,417 tons on March 31, 1936.

A new high record of paperboard production in the United States was reached during February. Despite the short month, mills in this country manufactured a total of 373,431 tons of board, as contrasted with 365,665 tons in January this year, and 271,107 tons in February last year, according to the Census Bureau's monthly compilation. Production during the first two months of the current year amounted to 739,096 tons, against 542,317 tons in the corresponding time a year ago, a gain this year of 34.3 per cent over last year, and a rise of 43.8 per cent compared with the first two months of 1935. February output was 37.7 per cent in excess of the similar 1936 month.

Significant in the board report are figures showing that mills at the close of February had unfilled orders calling for a total of 236,011 tons of their product, representing an increase of 158 per cent over 91,917 tons on the same date last year, and comparing with 221,409 tons at the end of January this year. New orders booked by mills during the first two months of this year were for 794,497 tons of board, a gain of 43.4 per cent above 553,697 tons in the same period of 1936.

Shipments of prepared roofing from manufacturing plants in the United States in February amounted to a total of 3,588,887 squares, according to the monthly summary of the Census Bureau. This was an increase of 50.4 per cent compared with 2,386,228 squares shipped in the preceding month, and a gain of 14.3 per cent over 3,139,038 squares in February, 1936. Shipments during the first two months of 1937 totaled 5,975,115 squares, a rise of 24.5 per cent over 4,797,901 squares in the corresponding 1936 period, and a gain of 165.1 per cent over 2,254,286 squares in the same time in 1935.

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◆ FORMERLY ASSOCIATED with the Oliver Continuous Filter Company and more recently connected with the Taintor Company, L. W. Knapp is now a member of the sales engineering staff of the Oliver United Filters, Inc. Mr. Knapp brings to his new duties not only a broad knowledge of the process industries but also a understanding of filtration gained through much previous experience.

◆ WHAT IS BELIEVED to be one of the largest stoker contracts awarded in recent years was given to the American Engineering Company by the Detroit Edison Company for three Taylor stokers, each to burn a maximum of 44,000 pounds of coal per house, for their Delray No. 3 Station extension.

◆ BEFORE THE DAYS of modern instruments the engineer was compelled to judge the efficiency of his furnaces by the steam pressure gauge and his practical knowledge of how a fire should look. Sometimes he guessed right; more often he wasted coal. The modern engineer calls upon chemistry and instruments for analyzing the products of combustion, to guide him in building furnaces and firing coal. Science guides him. Practical results verify each step. He knows he is right.

◆ BOILERS WITH SMALL LIBERATING surface in which the water level varies greatly with slight changes in pressure or load, should be equipped with longer gauge glasses, and the level should be permitted to swing through its natural travel. On such boilers the feed water regulators should be set for a wide range in level, and thus not be affected by changes in level which ordinarily would cause the regulators to give intermittent operation.

SHOW US—

WE'LL BUY!

A Message to Suppliers of the Paper and Pulp Industry:

We're having a get-together of your best customers and prospects in the Paper and Pulp Industry on June 23rd, 24th and 25th at Springfield, Mass.

The occasion is the 18th Annual Convention and Exposition of the American Pulp and Paper Mill Superintendents Association—One thousand and more Paper and Pulp Mill Presidents, Managers, Superintendents and Technical Men will attend—A wide-awake group of progressives, looking for new ideas, processes, materials and equipment.

We've planned a PAPER PROGRESS EXHIBIT to enable you to show us your products. It will be conducted on the same floor as the Convention sessions in the new Industrial Arts Building of the Eastern States Exposition Group. Conditions will be ideal for active promotion and sales work.

So, we repeat . . . *Show* Us—We'll Buy! Plan to reserve booth space *now* by writing to L. P. Taylor, General Headquarters, 134 Chestnut Street, Springfield, Mass.

"See You at The PAPER PROGRESS EXHIBIT"!

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS' ASSOCIATION

Convention Committee

Domestic RAW MATERIALS

◆ Papermaking Rags

In spite of the brisk operation of paper and roofing mills and their heavy consumption of raw material, the papermaking rag market has developed its customary seasonal trend in the spring—downward. That is to say, some classes of rag stock have declined fairly sharply in recent weeks, notably roofing grades and those other rags which usually come into evidence in larger quantity during the house-cleaning period of the year. On the other hand, some rags for papermaking—and within this group new cuttings stand out boldly—not only continue firm but tend upward in value.

On the whole, the papermaking rag market is moderately active. There is not the breadth nor urgency to the demand emanating from consuming quarters as was observable a short while ago, yet paper, roofing and other manufacturers are absorbing supplies in comparatively good volume and with a consistency that lends a distinct amount of support to the market. Another very important sustaining factor is the foreign situation, not alone as concerns the increasing call from abroad for suitable rags for export from the United States to Europe, but in addition the relatively strong market condition in consuming countries across the Atlantic which is restricting the supplies available for shipment to our shores.

It is a definitely established fact that sizable lots of some grades of papermaking rags, more particularly new cotton cuttings, have been exported from here to Europe, and foreign buyers are evincing increased desire for American supplies, evidently because they are unable to secure the rags needed in home or nearer sources. Stocks of some cuttings have been so well depleted by exports from the United States that dealers have limited quantities to offer to domestic paper mills; moreover, being in this highly favorable position as regards supplies, they are enabled to adopt a more or less independent attitude concerning the prices asked on such material as they have to sell. Grades like No. 1 new white shirt cuttings, unbleached muslins, hosiery and underwear cuttings, corset cuttings and others are well sold out, and firm quotations are named and strictly adhered to by dealers.

Roofing paper manufacturers, having accumulated big inventories of rags, withdrew at least in part as buyers recently, and with the demand considerably curtailed, market prices promptly receded, the down trend being aided by the seasonally larger amounts of roofing rags coming into view. Both the eastern and western markets declined to the extent of $5 per ton in a single move, and have eased a bit more meanwhile. However, the price level of foreign roofing rags has held relatively steadier, and quotations named by shippers abroad are far above a parity with domestic rags of corresponding grades, and seem likely to remain so owing to the active demand in Europe for these rags.

New York dealers quote domestic roofing at 1.75 cents a pound f.o.b. shipping points for No. 1 stock, and 1.60 cents for No. 2. Old white cottons and thirds and blues tend to ease quotably at around 3.75 cents for No. 1 repacked whites, 3.50 cents for No. 1 miscellaneous whites, and 2 cents for repacked thirds and blues. Imported roofing rags are quoted at up around 2.50 cents per pound for linseys and 2.25 cents for dark cottons, ex-dock American Atlantic ports, and importers assert they cannot buy abroad at prices permitting them to sell to mills below these figures.

No. 1 white shirt cuttings are held at 9.50 cents to higher a pound f.o.b. dealers' shipping points, new unbleached muslins at 10 to 10.50 cents, fancy shirt cuttings at 4.25 cents, new blue overall cuttings at 7.75 cents, light flannelettes at 7.50 cents, soft black silesias at 4.50 cents, light silesias at 6.75 cents, bleached canton flannels at 9.25 cents, new white linens at 12 cents or more and grey linens at 11.50 cents. New white canvas cuttings are an item strongly priced up around 9.50 cents per pound.

◆ Old Paper

Of all the raw materials for papermaking, waste paper is showing greatest activity and price strength, with the possible exception of wood pulp, for which, of course, old paper is a substitute. Demand for the various grades of waste paper, from board and paper mills alike, continues brisk, and it is clearly apparent from the manner and volume in which manufacturers are buying that consumption is way up undoubtedly on record levels. Mills, from all appearances, are in some instances having difficulty filling their needs, even though they are bidding and paying prices substantially above any which have been seen in this market in a long time.

Shavings are selling at 2.75 to 3 cents per pound and higher for No. 1 hard white, 2.50 cents for No. 1 soft white and 2.90 cents for one-cut soft white. No. 1 hard white envelope cuttings are quoted at 3.25 cents a pound at shipping points, old books and magazines at 1.35 cents, white ledgers at 1.90 to 2 cents, colored ledgers at 1.50 cents, new kraft envelope cuttings at 3.25 cents, and No. 1 old kraft at 2 cents. Mixed paper of No. 1 quality is 65 to 70 cents per hundred pounds f.o.b. New York, folded newspapers 72½ to 75 cents, and old corrugated boxes 90 to 95 cents.

◆ Rope and Bagging

Paper mills have paid 5.50 cents per pound for No. 1 domestic old manila rope f.o.b. dealers' points, and between 5.25 and 5.50 cents for foreign old rope ex dock New York. Considerable quantities have been absorbed at these price levels, and now that consumers apparently have covered their wants for a time, the market has turned quieter. Demand for bagging also is limited. There is little pressure to sell, however, and asked prices remain around 2.10 cents a pound for No. 1 domestic scrap burlap and 2.45 cents for No. 1 gunny. Roofing bagging is lower at 1.45 cents at shipping points. Higher prices than these are quoted on imported bagging.

◆ Pulpwood

Reports tell of a firm to strengthen the pulpwood market. Consumers are taking supplies freely and are looking about for additional available wood.

◆ Mechanical Pulp

There is little supply of mechanical pulp obtainable in the open market. Most domestic and Canadian producers have their output sold and are pushing their plants to take care of contract or regular customers. Still, prices of domestic and Canadian groundwood are relatively lower than those on Scandinavian pulp, and buyers are expecting to fill their wants chiefly with groundwood from sources on this side of the Atlantic. Prime freshly ground domestic and Canadian groundwood is about $35 to $37 per ton delivered consuming centers, depending on the haul from producing mills. Canadian manufacturers quote around $34 a ton ex dock New York for groundwood brought down by schooners. Quotations from Europe generally are $37 to $38 per short ton for dry pulp, ex dock American Atlantic ports.

◆ Chemical Pulp

Domestic pulp manufacturers wish they had more pulp to dispose of, and pulp consumers wish so too. Producers could easily market much larger tonnages if they had the pulp to sell, and consumers would be pleased to secure additional supplies at present costs of domestic pulp. This is especially true as regards sulphite, which pulp of domestic origin is selling at prices to contract buyers far under imported sulphite.

Second quarter bleached sulphite is 2.90 cents upwards per pound to contract customers, and unbleached sulphite 2.30 cents, ex dock Atlantic seaboard. Domestic bleached soda pulp is 2.90 cents delivered paper mills. Domestic kraft is around 3 cents at pulp mills; the full range might be from 2.75 to 3.25 cents, depending on freight to consuming points.

◆ Chemicals

Casein prices have eased a bit more to 14 and 14.50 cents a pound for standard and finely ground domestic, and 18 to 18.50 cents, respectively, for foreign. Papermaking gum resin has firmed slightly to $8.10 per 280-pound barrels f.o.b. southern producing points. China clay exhibits a stiffening tendency.

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Beyond a Question of Doubt

☆ ☆ ☆

Installations of the FRITZ REFINING AND HYDRATING MACHINE have demonstrated beyond a question of doubt that its use, when compared with ordinary methods of stock preparation, results in:

1. More complete separation of fibers.
2. More uniform hydration of stock.
3. Less broke.
4. Better paper.

These outstanding effects are obtained with less horsepower per ton of stock treated and with much less floor space.

☆ ☆ ☆

Love Brothers, Inc., Aurora, Illinois

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

Stories are going the rounds of the trade that converting mills in some cases have been compelled to shut down momentarily because of a lack of wood pulp. Such instances, if true, unquestionably are the great exception to the general rule, yet it seems highly probable that there have been these actual occurrences.

The market situation in chemical pulp is equally as strong as it has been in recent months. It is, in fact, a bit stronger, even though the market may be somewhat quieter, viewed from the angle of the volume of demand coming into evidence. The principal reason for the rather quieter market atmosphere would seem to be that consumers, having been frustrated in so many attempts to unearth additional available supplies of pulp, have let down in their efforts to find producers or importers who have pulp to sell. Prices are strong to an extreme, and it would certainly appear that, unless something now entirely unforeseen happens, higher prices will be witnessed before the market recedes to any lower level.

As a matter of fact, prices are purely nominal in a great majority of instances. Pulp for 1937 apparently is sold up; at any rate, producers in Europe have sold all their output they care to commit themselves on thus far into the year. Perhaps some of them are reserving a portion of their production for disposal later in the year, when they may secure higher prices, but it is now a difficult task to get chemical pulp of any kind for shipment from abroad over the balance of the current year. Also, most producers in Europe are unwilling to sell for 1938 as yet, the chief reason advanced being they are not aware what their wood costs are going to be for next year and therefor do not wish to contract on their product until possessed of a better idea of what their manufacturing costs likely will amount to. Another factor entering the situation is that demand for pulp from consuming countries other than the United States is just as brisk as from here, if not more so, and it is asserted European manufacturers are receiving higher prices in some markets than from America. Thus, they are none too eager to direct their product or even their sales energies here.

Nominal prices on imported pulp for spot or near delivery are in the vicinity of 4.25 cents per pound ex dock American Atlantic ports for prime bleached sulphite, 3.50 cents for prime strong unbleached sulphite, and 3.25 cents for prime kraft pulp. Whether any sizable lots can be found at these prices is something only pulp buyers themselves can ascertain definitely. Reports say sales have been made at these and at higher levels. As far as sulphite is concerned, producers abroad want these same figures for shipments the remainder of this year, and also for 1938. Kraft on contract for next year is reported about 2.75 cents, landed at U. S. ports, with this price level gradually creeping upward as supplies for 1938 become harder to obtain.

Foreign groundwood is quoted at $37 to $38 per short ton for dry ex dock American Atlantic seaboard, and approximately a dollar a ton less for moist. Sellers abroad are very firm on groundwood prices, and do not seem particularly eager to effect sales here.

Importations of pulp into the United States continued on a high level during February, reaching a total of 191,204 short tons of chemical pulp of a value of $7,476,222, according to U. S. Department of Commerce figures, compared with 190,645 short tons valued at $6,989,194 imported in January this year, and 143,454 short tons of a value of $5,602,125 in February a year ago. The two months' total this year aggregated 381,849 tons of a value of $14,465,416, against 334,392 tons valued at $12,544,567 in the corresponding time of 1936. Mechanical pulp imports in February amounted to 15,262 short tons of a value of $287,856, contrasted with 12,313 tons valued at $212,024 in the same 1936 month, and made a total for the first two months of this year of 33,775 tons of a value of $611,554, against 30,525 tons valued at $531,931 a year ago.

◆ Paper Stock

The United States imported 25,891,287 pounds of rags for papermaking, valued at $509,101, in February last, compared with 16,172,189 pounds of a value of $227,285 in the similar month last year, according to U. S. Department of Commerce statistics. Imports during the first two months of the current year totaled 48,240,580 pounds of a declared value of $954,485, against 34,975,417 pounds of a value of $467,302 in the corresponding time of 1936. Imports of miscellaneous paper stock, consisting of old rope, scrap bagging, waste paper, etc., in February were 9,239,490 pounds of a value of $192,916, making a total for the first two months of the year of 19,553,910 pounds of a value of $389,753, contrasted with 20,233,907 pounds valued at $318,362 in the similar two months last year.

◆ Paper

Paper and paper imports into the United States in February reached a total value of $8,492,894, according to official U. S. Department of Commerce reports, showing an appreciable increase over receipts valued at $6,442,343 in the same 1936 month. Standard newsprint comprised the great bulk of these importations, imports of this item amounting in value to $7,457,339 in February, against $5,441,937 in the same month last year. The next largest import was cigarette paper, valued at $273,132 in February last, contrasted with $199,856 in the similar 1936 month.

Paper imports during the first two months of this year aggregated in value $18,153,154, against $13,722,515 in the same period a year ago.

EXPORTS

Exports of paper and paper products from the United States are registering a gain this year over shipments last year. Department of Commerce figures divulge that February exports reached a value of $2,079,284, comparing with $1,684,930 in the same month in 1936, making a total for the first two months of the current year of $4,002,279, against $3,507,128 in the same time last year, a rise of 14.1 per cent over a year ago.

Exports of newsprint paper in the first two months of this year were valued at $62,224, compared with shipments valued at $145,541 in the same time last year. Shipments of uncoated book paper were valued at $205,670, against $96,711 a year ago; of writing paper, $472,735, against $341,830; of wrapping paper, except kraft, $323,909, against $295,245; of kraft wrapping, $41,569, against $20,767; of tissue and crepe paper, $115,987, against $101,770; of fiber insulating board or bat, $276,917, against $201,479; of blotting paper, $52,364, against $41,674; of toilet paper, $136,821, against $100,797; of greaseproof and waterproof paper, $200,449, against $207,961; of sheathing and building paper, $51,516, against $51,478; of boxboard, $193,504, against $287,748; of other paperboard, $178,433, against $147,563; of paper bags, $176,430, against $123,028; of paper boxes and cartons, $132,093, against $113,377, and of vulcanized fiber, $186,498, against $190,157.

Exports of paper base stocks in the first two months of this year were valued at $1,318,643, contrasted with $1,190,229 in the same period last year. Chief among these shipments was sulphite wood pulp, valued at $977,454, compared with $984,765 a year ago.

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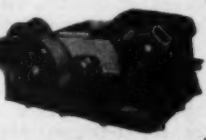

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